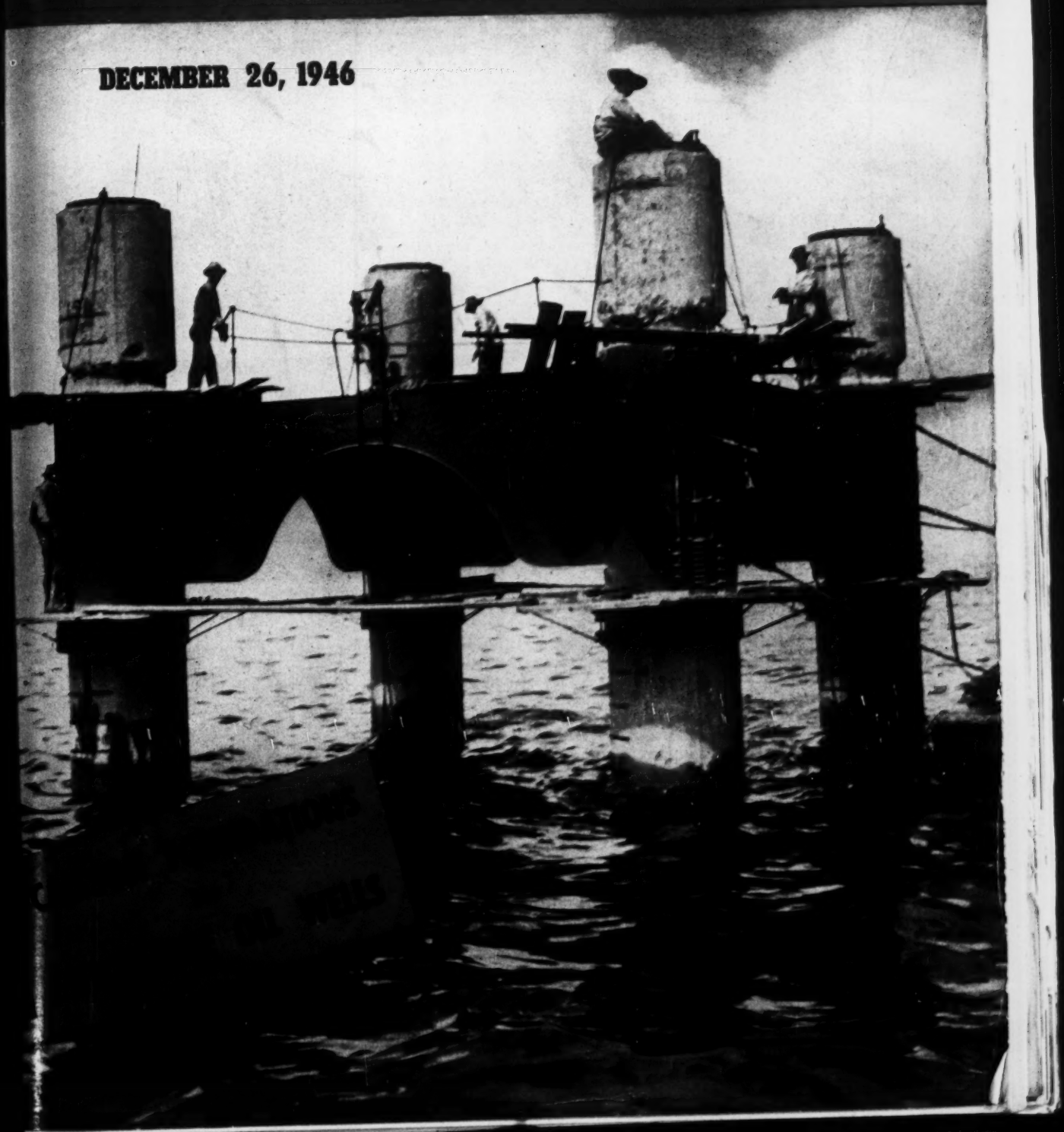
ENGINEERING NEWS-RECORD

DECEMBER 26, 1946



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Since wrought iron is a veteran in such applications, our Engineering Service Department was able to quote a number of case histories. A New York concern that standardized on wrought iron for heating coils in evaporator pans reports that it lasts twice as long. One Michigan producer has found that wrought iron gave an average of seven years service when handling hot brines, as compared to four years from other materials. An Ohio plant says, "Wrought iron lasts 16 years . . . ordinary materials last only two." Another Michigan company got from 3 to 4 years of service from ordinary materials. Wrought iron lasts them about 10 years.

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December 26, 1946

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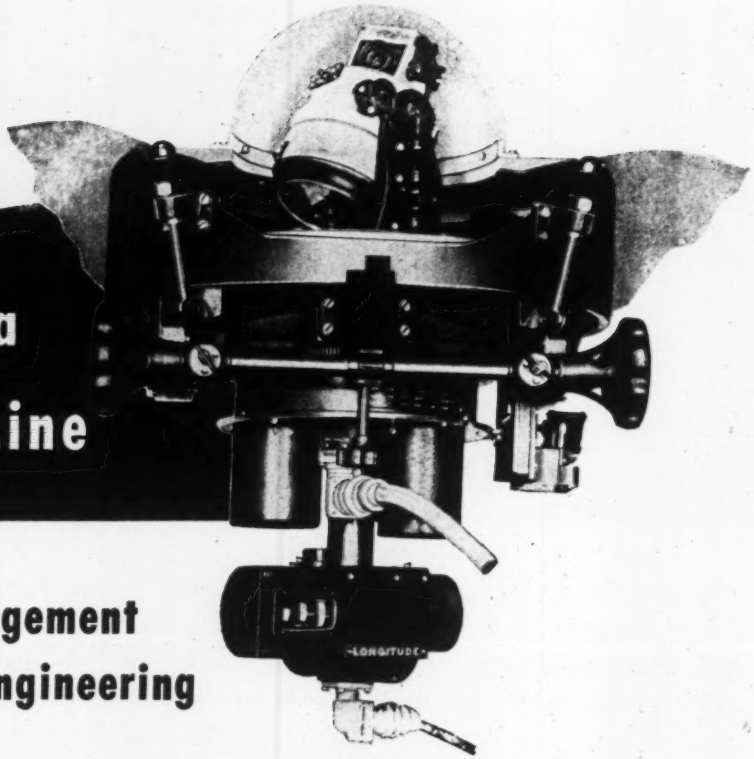
Thinking a Straight Line



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Construction Trends

Highway Contracts Top 1940 Record

Highway construction rolled up a record contract volume of $749,959,000 in the first 50 weeks of 1946, as reported by *Engineering News-Record*. This is 10 percent greater than the 1940 high year of $678,172,000 in new highway contracts, and 230 percent greater than 1945 contract awards which totalled $227,258,000.

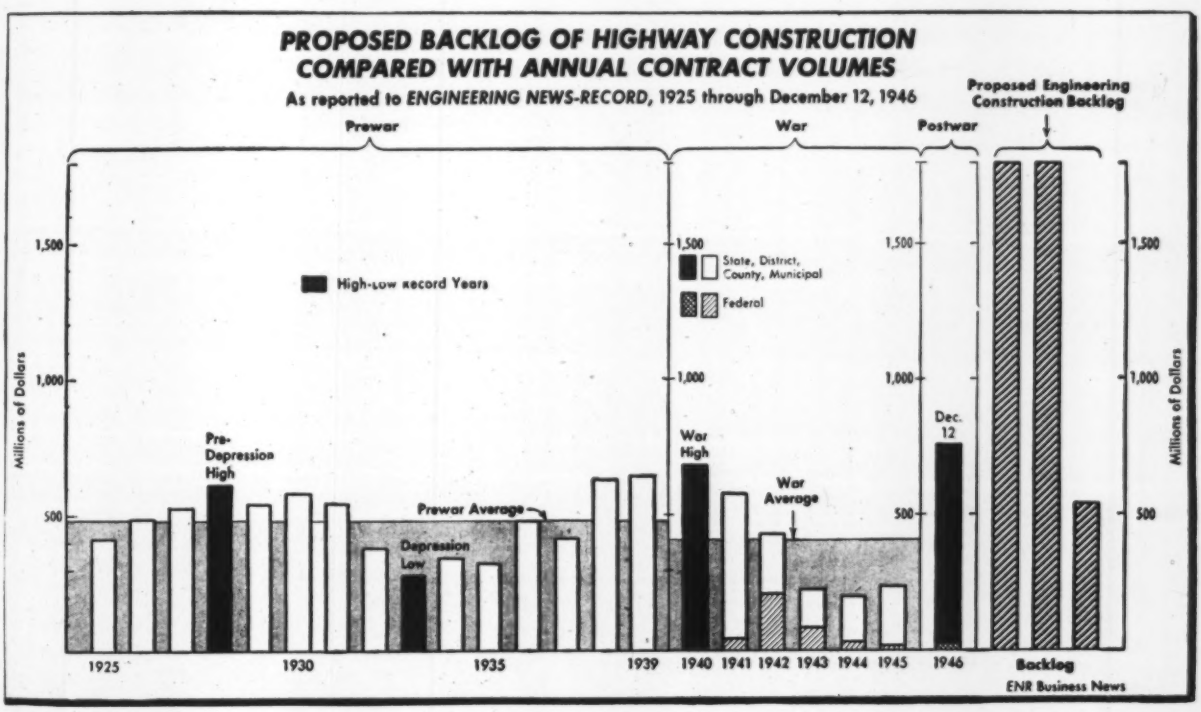
Weekly highway construction in 1946 has averaged $14,199,000, 61 percent more than the prewar weekly average of $9,287,000, and 92 percent more than the average war week of $7,826,000.

In 1946, only 3 percent of all highway construction, $19,696,000, was federal work, while the remaining 97 percent or $730,263,000, was state, district, county, and municipal work. This compares to 1945 federal highway work totalling $13,167,000, 6 percent of all highway contracts, and 1945 state and municipal highway contracts, $214,091,000, which comprised the remaining 94 percent.

Geographically, the distribution of highway contracts during the 50 weeks of 1946 is West of Mississippi, $201,004,000; South, $192,889,000; Middle Atlantic, $115,433,000; Middle West; $102,640,000; Far West, $100,068,000; and New England, $37,925,000. West of Mississippi contract awards are 27 percent of all highway contracts; South, 26 percent; Middle Atlantic, 15 percent; Middle West, 14 percent; Far West, 13 percent; and New England, 5 percent.

The cumulative backlog of proposed projects through December 12, 1946 is $4,139,476,000. This balance remains after $68,875,000 was deducted as projects advanced to active status this year. Of the total backlog, $1,125,095,000 is scheduled for Middle Atlantic states, $934,393,000 for Middle West, $870,938,000 for Far West, $804,822,000 for West of Mississippi, $202,848,000 for South, and $201,380,000 for New England.

In 1946, only 9 percent of highway contract awards came out of the accumulated backlog. However, the present backlog of proposed projects alone is sufficient to provide more than five years of highway work at the 1946 record volume rate.



When Winter Threatens Building Time...

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News of the Week

ENGINEERING NEWS-RECORD • DECEMBER 26, 1946 • VOLUME 137 • NUMBER 26

Non-residence building curb to be eased early in 1947

Fleming cites increasing production of materials, tells Senate group he won't be forced into indiscriminate relaxation—Rental housing to be pushed

In virtually his first statement as head of the Office of Temporary Controls (*ENR* Dec. 19, vol. p. 823) Maj. Gen. Philip B. Fleming Dec. 18 told members of a subcommittee of the Senate Small Business Committee that there would be a swift relaxation in controls over non-residential building "early in the new year".

Although the new OTC chief did not indicate directly the extent of the planned relaxation, other well-informed Washington sources concurred in the belief that the present limitation of $35,000,000 per week on non-residential construction—enforced under rulings of the now-defunct Civilian Production Administration—would be raised to at least $50,000,000 weekly.

Citing figures showing increasing production of essential construction materials—the same figures which prompted President Truman's action two weeks ago in removing all remaining construction controls except those on non-residential work and rental housing—Gen. Fleming told Senators that easing of the limitation would be followed by further actions in the same direction as materials become more plentiful.

He emphasized, however, that his new agency will not be stampeded into hasty decontrol actions, despite its determination to wind up all wartime controls as quickly as possible.

"I hope we can now be freed of the almost ceaseless clamor of various pressure groups that has bedevilled any kind of controls since the end of the war," Gen. Fleming said. "If given an inch (in the way of relaxation) they immediately started demanding a mile."

Pressure groups critized

"It will be our purpose to wind up all controls as quickly as possible, but I should like to serve notice now that we shall remain attentive to the legitimate needs of business—we do not intend to sway in every passing breeze stirred up by special interests."

Commenting on the general program, the OTC head said that he believed such relaxation will not interfere with housing, but will in general, accelerate it. It will be the policy of his agency, he said, to "maintain a sizeable margin" of materials in favor of housing, with relaxation of control on other types of construction coming only as supply of housing materials.

Speed rental housing

Frank R. Creedon, newly-appointed National Housing Expediter, appearing before the same Senate group, said that the "big push" of his office will be towards rental housing construction.

He disclosed that, instead of price ceilings on new housing, there would be only the two requirements of year-round occupancy and limitations on floor-area enforced in connection with a permit system for new housing construction.

He added that the floor area per dwelling will be limited to not more than 1,500 sq. ft., measured to the outside exterior walls at floor level. Basements, garages, open porches, terraces and unfinished attics will be excluded from this measurement.

"The present mass of regulations, controls and paper work," Mr. Creedon said, "will be eliminated. Only a permit to build will be required."

Opposition to the removal of the controls was presented at the same subcommittee hearing by John W. Edelman, legislative representative of the Congress of Industrial Organization; R. J. Thompson, of the New York State Housing Committee; John H. Snyder, mayor of York, Pa.; and the National Association of Real Estate Boards.

"Heroic" public works plan unneeded

"Heroic" measures of federally-sponsored public works will not be necessary to maintain a balance in the nation's economy, according to the first report of the President's new Council of Economic Advisors, released at Washington last week.

The council's recommendations are expected to form the basis of Mr. Truman's annual report on the state of the nation when the 80th Congress convenes.

Asserting that the outlook for the next few years—authough it may include a slight business recession—is generally good, the council asserted that the "impediments to prosperity" in the near future are of such a nature as must be worked out, without benefit of government intervention, "through the practical wisdom of management and labor, farmers and financiers."

"In a sense, of course, the government is . . . an indirect influence in the (construction) situation," the council said. "Through veterans hospitals and through whatever construction work is undertaken in lines deferred by agencies during the war, it is bidding for both labor and materials which are already short. No one would . . . suggest that the government not do these things . . . but we cannot ignore the conflicting factor they inject into the general economic situation. Government has in fact withdrawn from such activities or pared them down. This deferment means that the . . . backlog can be made available at some subsequent time when private demand slackens.

"While the prospect for high employment and production in the near future is good—barring a possible slight dip—it is . . . recognized that the bases of this activity are somewhat artificial. Thus the plans of private business and the thinking of government cannot too soon be directed towards appraising the probable duration of the present sources of activity, and toward forseeing what may be done to utilize the nation's resources after the present stimuli have been removed or weakened."

NEWS IN BRIEF

In telegraphic form, here are latest news developments on the engineering and construction front during the week.

Construction—Washington State College, *Pullman, Wash.*, has plans for a $1,500,000 classroom building on which bids are to be asked soon . . . State institutions in *Oklahoma* have submitted for budgetry purposes an outline for building programs which would cost $33,946,076 . . . The Department of Wharves, Dock and Ferries, *Philadelphia, Pa.*, has plans for four municipal piers along the Delaware River, the cost estimated at $20,700,000 . . . A $9,168,245 power plant is planned by the Bethlehem Steel Co. at *Sparrows Point, Md.* . . . $300,000 has been set aside for improvements to Forbes Field (baseball) at *Pittsburgh, Pa.*

Highways—The *Virginia* State Highway Department opened its 1946-47 fiscal year with cash on hand of $20,883,000 . . . Under a federal aid highway program *Maricopa County, Ariz.*, will widen five major traffic arteries into *Phoenix* and three narrow bridges over the Grand canal . . . A total of $3,827,073 has been sent to *Wisconsin* communities as their share of the 1946 highway privilege tax to be used for local highways . . . Philip H. Kitfield, chief engineer of the *Massachusetts* State Department of Public Works, says that about half of the state's highways must be renewed or replaced . . . The city council of *Fort Wayne, Ind.*, has approved the plans of state and federal officials for the proposed $27,000,000 superhighway system through the heart of the city . . . A joint budget committee of the *Arkansas* House and Senate has approved the highway department's request for $18,000,000 for the 1947-48 biennium.

Sewers and water supply—*Abington Township, Pa.*, is considering bids of $630,926 for a sewage treatment works . . . Plans for sewage treatment plants and other sewer installations are being drawn for *Maumee* and *Perrysburg, Ohio* . . . Water works improvements at *Cincinnati, Ohio*, expected to cost about $7,000,000, will require five years to complete . . . *Terre Haute, Ind.*, is studying a resolution seeking approval for final plans for the $2,350,000 sewage disposal plant and interceptor sewer planned to be in operation by Jan. 1, 1948 . . . *Indianapolis, Ind.*, City board of Works and Sanitation has announced a program of extension and modernization of sewage facilities in the city and in the Marion County-city sanitation district. These agencies were authorized by the 1943 state legislature to permit residents of the county to use the facilities of the city sewerage system.

Housing—Plans for a $2,500,000 apartment house at *Portland, Ore.*, have been announced by Harry Mittleman . . . War Assets Administration has authorized the University of Minnesota to acquire 19 buildings at the Rosemount plant, *Minneapolis, Minn.* . . . Rittenhouse Construction Co. has started on a $1,000,000 development in southwest *Philadelphia, Pa.*, and Hartel Homes, Inc., $1,000,000 in the northeastern section . . . Sloane Blabon Corp., *Trenton, N. J.*, has plans under way for plant expansion to cost $5,000,000.

$6 million roads, sewer work set at Cleveland

Mayor Thomas A. Burke of Cleveland, Ohio, has approved a $6,000,000 capital improvement program to be undertaken in 1947 for street paving and bridge repairs. In addition, the city stands ready to spend $3,000,000 as its share of the cost of the proposed W. 14th St. bridge —an integral part of the long-awaited "inner belt" of freeways. Although plans are expected to be completed for the bridge in 1947, the work is not expected to start until a year later.

Definitely scheduled for 1947 is $2,380,000 worth of work on four bridges and one underpass; $550,000 on enclosure of Big Creek; $996,000 on paving projects; $250,000 as the city's share of repaving state routes through Cleveland; $250,000 on street openings and widening; and $1,500,000 on construction of new sewers.

The E. 34th St. bridge's span will be shortened by 700 ft. at a cost of $560,000; the W. 3d St. bridge will be widened at a cost of $100,000; a new underpass will be built on E. 79th St. for 455,000; the Fulton Road bridge will get a new deck and other repairs for 575,000, and the Abbey St. bridge will receive new deck and other repairs for $690,000.

Big Creek is currently being enclosed from W. 117th St. to Lloyd Road S. W. at a cost of $158,000. In 1947 the city will continue the enclosure work, spending $275,000 on it east of W. 117th St. and $275,000 west of Lloyd Road.

HOG HAIR SILENCES SKATES

In a large roller skating rink just completed and opened at Mesa Junction, Colo., a specially-constructed floor is soundproofed with layers of hog hair between the concrete and wood layers. This method of absorbing the roar from skate wheels was suggested by City Building Inspector R. J. Roberts.

Two carloads of bristles were used in the job.

The floor will accommodate up to 700 persons.

Illinois cities consider traffic-easing plans

Officials of the cities of Rock Island, Moline and Peoria, Ill., last week were considering traffic improvements involving expenditures totalling more than $21,000,000.

Plans to provide an east-west 4- and 6-lane highway through Rock Island and Moline, and for four north and south feeder roads from the outskirts of Rock Island, Moline and East Moline, at a total estimated cost of $4,400,000, were revealed at a recent meeting of the Rock Island County Board of Supervisors.

The county road program replaces, to a large extent, a group of projects reported at the July meeting of the board, some of which have been eliminated. The new plan is being considered by the county and state aid road committees and will involve a bond issue.

The chief project in the group proposal is the paving of an inter-city route in the cities of Rock Island and Moline, beginning at Eleventh street and Twenty-first avenue, Rock Island, then north to Seventh avenue; then east on Seventh avenue to Thirty-fifth street.

Peoria's plans

H. W. Lochner, president of Lochner Co., Chicago, Ill., on the basis of a traffic survey of the Greater Peoria area, outlined to officials from Peoria, East Peoria, Peoria Heights, and Bartonville plans in a rough draft stage for a $17,000,000, 20-year, traffic project. Included in such a plan would be a new downtown bridge, in line with Walnut St., over the Illinois River just south of the two present bridges, to cost approximately $5,800,000. This proposed bridge would reduce downtown traffic 35 percent, compared with only an estimated ten percent reduction at another proposed site also studied. It was found that 55 percent of Peoria's downtown traffic is "through" traffic.

Street improvements under the program would involve widening West Washington St. through the industrial section of East Peoria at $2,100,000, officials said.

U. S. Public Health Service to prepare new industrial water use standards

In cooperation with local groups it will set up water quality criteria for irrigation and other industrial uses

A program whereby the U. S. Public Health Service will prepare—in cooperation with local groups—quality standards for water supplies for irrigation and all major industrial uses was approved by the State and Territorial Health Officials Association at its recent annual meeting in Washington, D. C. Because of this strong backing, this plan met with the approval of the Public Health Service and preliminary steps towards carrying out the desired work are soon to be taken.

In the past the Public Health Service has been responsible only for the preparation of satisfactory drinking-water standards for use on interstate carriers, although the standards were later adopted for municipal supplies throughout the country. Thus the new program, which will take several years to effect, will be an entirely new job for the agency.

Two important factors explain why the state officials are willing to assign the big task to a federal agency, rather than attempt to do the job themselves. One of these is that adequate knowledge is lacking as to what constitutes the best water quality for some of the newer industrial processes, or if this is known, the data are not readily available to many groups. That the local health officials and sanitary engineering groups are not able to provide the industry with much of the information it needs is the second important reason the association has recommended that the new program be launched. The strong pollution abatement programs under way in several states is also closely tied in with the new plan.

New country-wide program

Some years ago the water resources committee of the National Resources Board did a limited amount of work of the type that is now scheduled. But when the board was eliminated that work ended. In recent years the USPHS assisted the Tennessee Valley Authority and the Upper Mississippi River Board of public health engineers in preparing criteria for setting standards for pollution abatement work in those areas. This aid was desired as part of a stream classification program and was looked upon as special work for the health service engineers. However, this experience, together with the USPHS basic research conducted at the Cincinnati water and sanitation investigations station, should prove valuable in the new country-wide program.

The Health Service plans to do its new job by close cooperation with local groups. One of the first tasks will be organization of an advisory board representing all major industries, local governmental groups, the national government and various engineering and health organizations. This board may have as many as twenty members.

During its meeting in Washington the State Health Officials Association also reaffirmed its position that it is strongly in favor of stream pollution abatement with federal cooperation. It went so far as to pass a resolution calling for federal legislation that would make the U. S. Government the motivating agency when state groups fail to carry out desired abatement work. This last action reveals that numerous local officials have concluded that the problem of pollution control is so great and so frequently an interstate problem that assistance by the federal government will be needed for much of the work.

Texas cities can annex nearby water districts

The Supreme Court of Texas ruled recently that cities may annex water tricts adjoining them, since such districts have limited functions.

A suit arose when the community of Pelly, near Houston, sought to annex adjoining Baytown following a Dec. 7 election in Pelly which authorized a home rule charter for that city. Pelly's attempt at annexation was fought in court action brought by the Harris County Water Control and Improvement District No. 7, which includes Baytown and three other independent water districts.

The water district argued that its inhabitants had the power of home rule and hence could not be annexed against their will. The water district also argued that Pelly was prohibited from exercising jurisdiction over it lest there would then be a duplication of functions.

The Supreme Court denied the arguments of the water district, ruling that to accept them would mean that municipalities could be hemmed in and surrounded permanently by governmental agencies of limited corporate functions such as water districts.

As a result of the Supreme Court's ruling, Pelly is empowered to assume the revenues and operation of the water districts it annexes.

Sewage treatment plants urged in Mahoning Valley

All cities in the Mahoning Valley from Warren, Ohio, to the Pennsylvania border must cooperate in sewage treatment activities for purification of the Mahoning River, according to Mayor Ralph W. O'Neill of Youngstown, as officials considered plans for construction of a $7,000,000 treatment plant. He pointed out that little would be gained by construction of the treatment plant and intercepting sewer system if other cities continued to dump raw sewage and industrial wastes into the river.

Jones & Henry, Toledo, consulting engineers, who were employed by the city of Youngstown, have also prepared estimates of sewer survey costs for all communities except Girard and Lowellville. The latter two are asking the Federal Works Agency for aid in planning individaul sewage control projects.

In the Youngstown survey, the consulting engineers advised against a joint sewage treatment plant for cities from Warren to Lowellville because of the excessive cost, estimated at more than twice the cost of building individual plants for each of the cities involved.

Big Kansas sewer project to start at early date

An important step in starting the $1,300,000 Mission Township sewer system in northeast Johnson County, (Olathe) Kan., was taken recently when N. T. Veatch of Black & Veatch, engineers, delivered the completed plans and specifications to the board of county commissioners in Olathe.

The commissioners announced that bids on the big construction project would be received until January 21 in the office of the Johnson County clerk in Olathe.

The action moves the sewer project from the drafting board to the construction stage. Veatch estimated that about one year will be required to complete all work, putting the system in operation early in 1948. Each contractor will specify the time required in the bids, which will be a factor in the award.

The plans must be approved formally by the Kansas State Board of Health. Two separate contracts will be let, one for collecting sewers and the other for the proposed pumping station and disposal plant.

St. Louis carpenters win 7½c per hr. raise

One Ohio union sues contractor because of non-union work, another promises no work stoppage by strikes—Other labor notes

A 7½-cent hourly wage increase, bringing the scale to $1.95 an hour, has been agreed upon by contractors and the American Federation of Labor Carpenters' District of St. Louis, Mo. The increase, effective Dec. 12, applies to 5,000 carpenters.

The contractors and the union carpenters made a joint request to the Wage Adjustment Board last April for official approval of the $1.95 scale but the Board on June 3 authorized a jump from the $1.70 scale then prevailing to only $1.87½.

With the passing of the Wage Adjustment Board and its wage controls, the contractors and union officials decided to recognize the pay level they had originally sought, $1.95 an hour. This wage scale will now be in official effect until May 1, 1947, when the union's contract with the contractors and builders will expire.

Ohio contractor sued by union

Stark County, Ohio, Building Trades Council, A.F.L., and two affiliated labor unions on Dec. 9 filed suit against F. C. Haffner, operator of the Haffner Construction Co., to compel him to employ only union craftsmen. John Gerber, president of the Council, George Teufel, business agent for the Common Laborers Union, and Thomas Oakes, business representative for the truck drivers' union, charged that Haffner had violated an agreement signed April 11, 1944. Haffner said the agreement "went out the window" with the war because the union could not furnish the men needed, so that he was forced to hire some part-time workers.

Promise no work stoppage

Members of the Youngstown Building Trades Council and the Builders Association of the Mahoning Valley have promised that there will be no work stoppage because of strikes or lockouts in the local building trades during 1947. The action was based on government abandonment of all wage controls which, the unionists said, had created unfair distribution of wage increases in some of the trades.

Higher pay granted in Atlanta

Pay increases ranging from 10 to 63 cents an hour have been granted to five of the major craft unions in Atlanta. Approximately 3,500 skilled workers affiliated with plumbers, steamfitters, carpenters, bricklayers and electricians are involved in the wage increase to the AFL union members.

Increases granted include: plumbers and steamfitters $2 from $1.75; bricklayers, $2 from $1.37½; carpenters $1.50 from $1.40 and electricians $1.80 from $1.65.

Urge new law in Virginia

A special session of the Virginia State Legislature, convening Jan. 6 at Richmond, will consider among other matters measures to outlaw strikes in public utilities, and to outlaw "closed shop" agreements, Gov. William M. Tuck said last week.

The special session was called primarily to consider increasing minimum pay of school teachers to $2,400—which would raise state expenditures by an estimated $6,000,000 yearly, but the governor said he would add the two labor matters to the agenda.

Extensive flood control planned for Los Angeles

Flood control projects to cost $243,074,800 have been authorized or are in the planning stage for Los Angeles County, Calif., according to a recent announcement by William A. Smith, chairman of the Board of Supervisors.

The first flood control work in Los Angeles County was started in 1919, and $172,814,384 has already been spent for dams, debris basins, reservoirs and storm drains, Smith said, but more money needs to be spent for flood protection than has been spent in the last 27 years. Proposed expenditures include $182,668,384 of federal money, of which $86,007,700 has already been authorized and $96,660,450 of which is for jobs approved but for which the money has not been authorized. In addition, the county flood control district plans to spend $62,406,650.

MIAMI BEACH CURBS CONSTRUCTION NOISES

During the season for winter visitors—from Dec. 16 to March 31—but not in the summer, Miami Beach, Fla., has banned all construction noises within 50 ft. of apartment houses and other occupied buildings.

The working hours for construction work further away than that will be limited to from 9 A. M. to 5:30 P. M.

The noise-makers objected to include cranes, dredges and concrete mixers.

San Diego civic center planning funds approved

Civic buildings, estimated to cost $4,050,000, are a step nearer the construction stage in San Diego, Calif., with advance planning funds totaling $105,650 approved early this month by the FWA's bureau of community facilities.

The largest of the projects is a Hall of Justice to be located in the San Diego civic center. Plans for ultimate financing of the $3,671,000 building call for raising half the necessary funds through general obligation bonds which are still to be voted on. It is expected that a special election will be held early in 1947 so that construction can start as soon as labor and materials are available. The remaining half of the financing, according to a San Diego Board of Supervisors' spokesman, will come from grants or loans from the state or federal governments. In the event sufficient funds from these sources fail to materialize, tax receipts will be counted on to furnish the balance of the necessary money.

For the second and smaller of the two projects, a $384,000 civic auditorium remodeling job, tax receipts will share the full load of the financing burden. This community auditorium will be located in Balboa Park, under present plans.

City manager charters approved for 70 cities

The recent approval of a city manager charter by voters in Hartford, Conn., marked continuation of a trend apparent in cities throughout the U. S. voting on major charter changes. Sixteen out of 23 cities voting favored adoption of the council manager form of government.

The International City Managers' Association reports that the Hartford action boosts to 70 the number of cities approving shifts to city-manager government during 1946. The previous high was 47 adoptions in 1921. The new Hartford charter, approved by a 2-to-1 vote, needs only state legislative approval before becoming effective. The next Connecticut legislature will convene Jan. 8.

If that approval is granted, it will increase to 724 the number of American cities using the city manager plan.

Other new council-manager cities include Santa Monica, Cal.; Emporia, Kan.; Ypsilanti, Mich.; Osborn, O.; Madison, Wis.; and Pendleton, Roseburg, and Springfield, Ore., the association reported last week.

Begin building all-steel, porcelain finish prefabs

A new idea in housing that literally started at the corner gasoline filling station has been developed into the Lustron Homes—a factory-built steel unit, finished inside and out in porcelain enamel.

Development of the building type started shortly before the late war, when engineers began work on a building that could be erected quickly, would be attractive, and could be kept clean easily for use as "gas" stations. Engineering was completed and a pilot model had been built when wartime restrictions on steel stopped work. Immediately after the end of the war, the work was started again with the idea of developing an attractive, easily built home to meet the current high demand in the housing market.

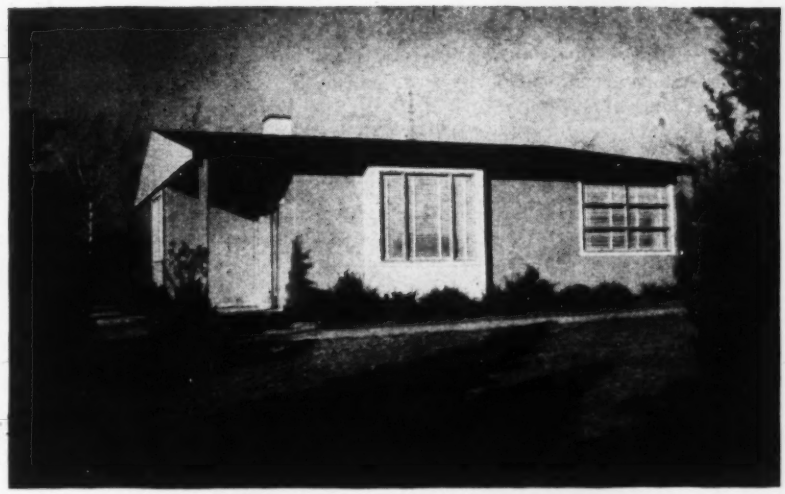
As finally developed and now being produced by the Lustron Corp., Cicero, Ill., a subsidiary of the Chicago Vitreous Enamel Co., the homes will be available in a choice of color, on a master foundation 32 ft. by 36 ft. The design provides for numerous interior arrangements, and the house is planned for warm-air radiant heat from the ceiling, supplied from a utility unit on the ground floor. No basement is planned.

The framework consists of specially designed light-gage steel members, fabricated into 8 x 8-ft. sections. Structural roof members are truss type, spanning the full width of the building. The roof itself and the steel panels that make up exterior walls are completely enamelled. These panels are designed with interlocking edges that are covered with a resilient plastic gasket.

Since no interior bearing partitions are required, interior partitions are designed for utility—forming closets with sliding doors, for example. Floors are covered with asphalt tile, and ample outlets for electric attachments are provided.

The radiant heat unit consists of a chamber above the ceiling panel, several inches in depth and the size of the entire house. The upper side of this chamber is heavily insulated. The hot air is circulated in the side walls to minimize condensation and over the entire ceiling area by baffles to assure proper and uniform circulation.

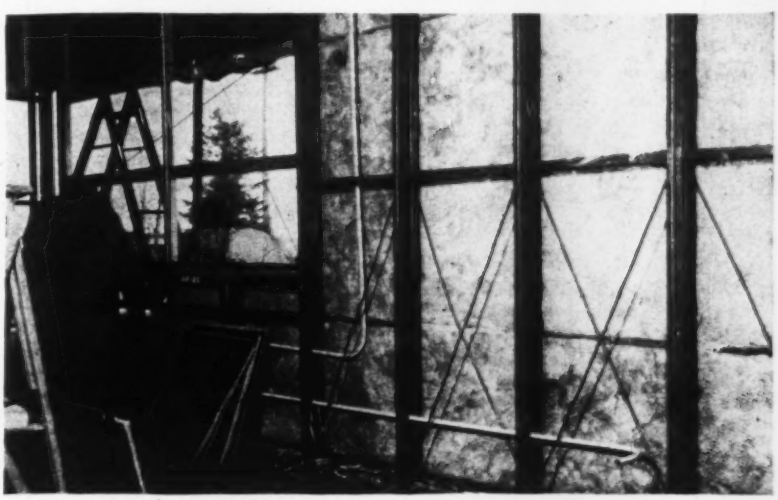
The Lustron Corp. believes that to produce a large number of low cost homes it is absolutely essential that mass production techniques and methods be applied in the manufacture of such homes, and that materials that lend themselves to mass production be used.



The new all-steel, porcelain-enamel house being built in Cicero, Ill., can be obtained in a variety of colors. About 32 / 36 ft., the building is planned for radiant heating.

Framework for the house is made up of specially designed light-gage steel members, fabricated into 8 x 8-ft. sections, easily installed by semi-skilled labor.

Ceiling panels are installed after the outside of the house is completed. Panels are finished in non-glossy eggshell white to harmonize with almost any interior color scheme.



After the framework is completely erected and outside panels installed, channels for electric wiring and piping are inserted in the walls, insulation put in place, and the interior finished with steel panels. To minimize condensation, warm air will be circulated in the walls.

Study huge Northwest reclamation job

Irrigation and multiple-purpose projects costing more than $1,000,000,000 are under investigation or consideration by the Bureau of Reclamation in the State of Washington, Regional Director R. J. Newell told the Washington State Reclamation Association recently.

He said the program, if carried out in full, would bring under irrigation more than 1½ million acres of new land—nearly triple the present irrigated acreage. Thus, the development would add the equivalent of more than three Yakima valleys to the wealth of the state. Supplemental water supplies would be provided for irrigated land now suffering periodic shortages.

On multiple-purpose and power projects constructed by the bureau and other agencies, more than 5,000,000 additional kilowatts of installed hydroelectric capacity would be provided to meet growing demands of the Pacific Northwest. This is approximately three times the existing generating installation in the state. Several projects would have major navigation and flood control benefits.

Self-liquidating plan

Under the Reclamation law, Mr. Newell declared, all of the investment in works constructed by the Bureau of Reclamation, except a small allocation to flood control, navigation, and fish and wildlife, would be returned to the Federal Treasury through payments by water users and from power revenues.

In moving forward in this program, the Reclamation Bureau is currently investigating nine multiple-purpose and irrigation projects in Washington. Two are in the advanced stage of planning, the 21,000-acre Kenewick Division of the Yakima Project, and the 4,800-acre East Unit of the Greater Wenatchee Project.

A study to determine ways and means of providing a supplemental water supply for the Yakima Valley will be undertaken in the spring. The Green-Puyallup Project has been under study and a detailed investigation of the Sequim Project has been recommended.

Study Columbia River watershed

"The bureau is conducting its project planning investigations in this state as part of the basin-wide study it is making of the entire drainage area of the Columbia River and its tributaries," Newell said.

"The great value of the run-off of our streams demands an orderly program of development so that the Pacific Northwest will not be robbed of riches inherent in water through piecemeal construction of individual projects without consideration of the region as a whole. Mistakes today might penalize us for all time to come," according to Mr. Newell.

The comprehensive report, Newell explained, will be released in two or three months. In preparing the document, he said, the Bureau is tying together all of its investigations, some dating back 25 years, and coordinating them with the pertinent findings of other agencies. The completed survey will view the water resources of the Columbia River Basin in their entirety and "will chart a logical course for their development to the end of providing maximum benefits at minimum cost.

Many artificial lakes planned for Ohio

The Ohio Conservation Division is planning the expenditure of $1,000,000 for the restoration of inland lakes, $1,000,000 for the development of three lakes in Clermont, Highland, and Clinton counties, $1,000,000 to construct three lakes in northern Ohio, and $1,000,000 for the restoration of fish and game. H. A. Rider, state conservation director, said he would ask the Legislature in January for an appropriation of $1,000,000 from the state's general fund. A further general appropriation of $3,000,000 for the 1947-1948 biennium may be sought later. These two appropriations would be in addition to the $3,000,000 which the division receives from the sale of hunting and fishing licenses, making a total of $7,000,000 in all for the 2-year period.

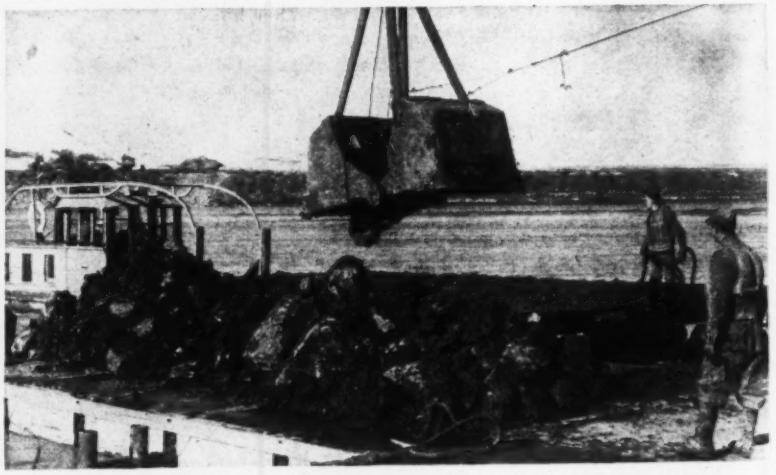
Sites for the lakes in the three counties already have been purchased and the $1,000,000 will be needed to construct the lakes and recreation parks.

Repair work to the chain of canal reservoir lakes in the central section of the state includes strengthening the north wall of Buckeye Lake, in Licking County, at a cost of $300,000.

General Noce new chief of Civil Affairs Division

Maj. Gen. Daniel Noce, since last June deputy director of the Service, Supply and Procurement Division, War Department General Staff, has been appointed Chief, Civil Affairs Division, Office of the Chief of Staff, the War Department has announced. General Noce succeeds Maj. Gen. Oliver P. Echols. A successor to General Noce has not yet been named.

Born in Colorado in 1894, General Noce joined the Army in April, 1917. During his long military career, he has held many responsible posts, including that of commanding officer, Engineer Amphibian Command, in which capacity, during 1942, he was responsible for the organization and training of four Engineer Amphibian Brigades. In May, 1943, he was assigned as Assistant Chief of Staff, G-3, E.T.O., and later held the same position in the North African Theater. In May, 1945, he became director of plans and operations, Army Service Forces, and on Jan. 1, 1946, he was appointed Chief of Staff and Deputy Commanding General, Army Service Forces.



***Work Starts on Garrison Dam**—Preparing the site for huge Garrison Dam (ENR Nov. 14, vol. p. 631) contractors bring in stone for anti-erosion dike at east side of Missouri River and excavate for an abutment of the construction bridge on the opposite bank of the stream.*

Potomac Commission outlines work

Completion of Savage River Dam and construction of several other pollution abatement projects on the Potomac River were listed last week by the technical committee of the Interstate Commission on the Potomac River Basin as the construction that should be given top priority. The committee made its recommendations at the commission's quarterly meeting Dec. 12-13 at Winchester, Va.

Construction of the dam on the Savage River about 20 miles from Cumberland, Md., was begun several years ago by the Upper Potomac River Commission and it is now about two-thirds complete. This latter commission has about $200,000 available for continuing construction and the technical committee has proposed that the money be transferred to the Army Engineers to resume operations. Completion of the dam by the Army was authorized but no money appropriated last summer when Congress passed the Flood Control Act of 1946 (*ENR* June 6, vol. p. 887). The dam will increase dry-weather flows of the river from 30 to 100 cfs. in the section between the cities of Luke, Md., and Cumberland, and thus would do much to overcome pollution of that stretch of the river caused by paper mills and other industrial plants.

Numerous other pollution abatement projects were given high priority by the technical committee after a careful study of all the work on which the commission hopes to provide assistance. These jobs included construction of additional sewer and treatment facilities for the cities of Cumberland, Md., Ridgley, W. Va.; Keyser, W. Va., Piedmont, W. Va.; Westernport, Md.; Luke, Md.; Winchester, Va.; and Waynesboro, Va. Equal priority was given to similar construction being planned by Alexandria, Va., Arlington and Fairfax counties in Virginia, and the District of Columbia.

Against industrial waste pollution

The committee also recommended a step up in the program to reduce the drainage of acid mine wastes into the river and the reduction of pollution caused by industrial plants. Organization of a school for sewage works operators to increase the efficiency of existing treatment plants and the establishment of many new sampling stations better to evaluate the pollution abatement needs in the basin were also recommended.

Because of the extensive progress that is being made in planning and financing new treatment facilities, many of the cities listed may be able to start construction next year, the commission was told. Many of the smaller cities mentioned have engaged consultants to prepare plans and much construction will be started next year. Washington, D. C., reported that it has plans 95 percent complete for its large program and Harry Hall, chief engineer of the Washington Suburban Sanitary District revealed that his organization was planning $5,000,000 of work, including $3,000,000 that could be started fairly soon. Some of this latter construction will permit the District of Columbia to treat the sewage from the suburban district in accordance with a plan already announced (*ENR* June 29, vol. p. 964) and expected to be formally agreed upon by all members in the near future.

P. A. Frye to direct Louisiana highway dept.

P. A. Frye, former executive director of natural gas conservation for the state of Louisiana, has become director of the Department of Highways for the State, succeeding D. Y. Smith.

Mr. Frye was connected with the highway department some years ago and for about 12 years has served as secretary and executive officer of the Louisiana Public Service Commission, for a year as Director of public service, and for the last two years as executive director of natural gas conservation.

San Francisco to seek new subway parking aids

The San Francisco Park Commission expects to readvertise for bids in January for construction of a 630-car underground garage at St. Mary's Park. A single bid submitted last summer was turned down because it listed no specific cost estimates and contained "unacceptable" qualifying clauses. (*ENR* Sept. 5, vol. p. 286.)

According to the commission's secretary, Gerald Linares, bids on similar parking facilities beneath Portsmouth Square and the Civic Center Plaza will be called later in 1947.

Boston taxpayers offered traffic improvements free

The Massachusetts State Planning Board will offer the City of Boston $110,000,000 worth of traffic improvements without cost to the taxpayers, members said in announcing a 1947 legislative program. The board asks:

(1.) A high speed elevated highway through the city from Cambridge to Roxbury, costing $60,000,000.

(2) A $20,000,000 high-level bridge over the Mystic River to Chelsea.

(3) A second tube to the East Boston Tunnel costing $15,000,000.

(4.) A payment of $15,000,000 for acquisition of the present East Boston tunnel from the city.

Planning board statisticians said these improvements can be financed by a 10-cent basic toll with the assistance of $25,000,000 from Federal Funds.

Atlanta speeds fire-prevention study

City officials of Atlanta, Ga., have moved swiftly to make all buildings safe from another holocaust such as the Winecoff Hotel fire (*ENR* Dec. 19, vol. p. 842) which caused the death of 121 and injury to scores of others.

Mayor Hartsfield has appointed a 9-member committee to draft new city building regulations and will ask the city council to take positive action at once.

A. G. Stanford, chairman of the building code committee of the Atlanta chapter of the Georgia Society of Professional Engineers, proposed seven of the nine members. The engineers had previously offered their services to assist in redrafting a building code ordnance. Mayor Hartsfield appointed two other members—City Building Inspector O. Marvin Harper and Fire Chief C. C. Styron.

The committee has been asked for recommendations covering these items:

1. Safety devices and construction styles and materials to be required for future buildings.

2. Minimum safety standards required of structures already in existence.

3. Emergency ordinances which should be passed immediately to provide protection while permanent requirements are being formulated and installed.

4. General revision of existing building requirements.

The city's 1943 edition of building codes was modeled after the National Association of Fire Underwriters and this is likely to be revised to insure added safety.

Investigation showed that the 15-story hotel, which burned Dec. 7, had no fire escapes, no fire doors and no sprinkler system.

County zoning code again proposed in Ohio

For the tenth time in 16 years, legislation providing for the establishment of a county zoning code in Ohio will be presented to the state's legislature at is January session.

The issue has failed of enactment nine times since 1930, but proponents hope to appease farm groups which have worked against county zoning in the past. Supporters say the measure is necessary for development of highways, expansion of cities, and protection of farmers near urban centers.

A supplemental amendment to the law creating county planning commissions is planned, to provide for zoning in counties which have established planning commissions.

The proposed amendment has two features designed to catch rural support: Zoning is restricted to those counties having planning commissions; and nothing in the act shall be construed as authorizing the requirement of building permits for farm buildings. Out of 88 counties in the state, 25 have established planning commissions.

Madison, Ill., purchases Mississippi River bridge

Madison, Ill., has acquired title to the $2,300,000 Chain-of-Rocks bridge spanning the Mississippi River between Madison and the northern part of St. Louis, Mo., through redemption of unpaid tax bills amounting to $4,540.06. The taxes on the Illinois side of the bridge were delinquent.

The bridge, built in 1929, cost approximately $2,500,000 and was acquired by the city of Madison for $2,300,000. Annual tolls over the bridge amount to $300,000. The bridge is used by coast-to-coast motorists avoiding heavy traffic in St. Louis and in the East St. Louis, Ill., suburban and industrial areas.

Want 4 new buildings for Indiana statehouse plaza

Proposals for a long-range building program that would add four new state buildings to the present Statehouse Plaza at Indianapolis, Ind., have been made by the Indiana State Office Building Commission, with the aid of the Indiana Economic Council, to Gov. Ralph F. Gates and the General Assembly.

These structures would include an office building of 335,000 sq. ft., and a museum and conservation building.

AED to report findings on surplus disposal

Preparing for their 28th annual convention, scheduled for Feb. 13-15 at Chicago, Ill., the Associated Equipment Distributors last week announced that a detailed report of investigations into disposal of surplus U. S. government property would be a feature of the meeting.

Charging that "chaos and inefficiency" exist to a greater degree than previously suspected in the government's surplus disposal efforts, the AED has already completed a preliminary survey of the situation, and plans to hold a "seminar" for businessmen at Washington, D. C., early in January, before making the detailed report at the annual meeting.

Low-rent housing planned at White Plains, N. Y.

The housing authority of White Plains, N. Y., county seat of Westchester County, has adopted a low-rent housing program of 550 units to be built on a 3-block site in the Brookfield Street-Fisher Avenue area. The estimated cost is $5,500,000. The authority expects to submit a loan and subsidy contract to the common council by Feb. 1. If the expected approval of the council is forthcoming, plans and specifications will be rushed to completion and bids solicited so that construction can begin in the spring.

The project will include 3 and 6-story buildings, the latter with elevators, all of fireproof construction. Playgrounds and parking spaces are part of the plan. The estimated rental for apartments is $35 a month, including water, heat, light and gas.

This project has been under long discussion, and several other sites were rejected because of objections of adjoining property owners.

A 6-fold building program for Minneapolis, Minn.

Mayor Hubert H. Humphrey of Minneapolis, Minn., has outlined what he considers to be six all-important community projects which are vitally needed to insure the growth and progress of that city.

He lists these projects thus in terms of their priority:

(1) The expansion of Wold-Chamberlain airport, or the development of a new airport equal to the needs of a metropolitan transportation center.

(2) Immediate action upon the grade crossings in south Minneapolis with the view of a series of grade separations that will become a part of the over-all plan of the inter-city express highway.

(3) Immediate expansion of the Minneapolis municipal auditorium.

(4) The construction of a new municipal hospital and the modernization of the present General hospital.

(5) The construction of a municipal and county public safety building.

(6) The expansion of parks and playgrounds with particular emphasis upon the development of an outdoor amphitheater.

Wide World photo

No Snow Shovelling—*Proprietors of the new structure being built for Best and Co. at Fifth Ave. and 51st St., New York City (ENR July 18, vol.p. 79) plan on no snow removal problem when the store opens for business. Radiant-heating pipes are being installed below the pavement.*

OBITUARY

Edward A. Varney, 51, of Watertown, Mass., a civil engineer and partner in the firm of Cleverdon, Varney & Pike Co., consulting engineers, Boston, Mass., died Dec. 15. He was graduated from Worcester Polytechnic Institute, and was the author of several books on building construction and engineering.

Claude F. Mullen, 72, president and founder of Master & Mullen Construction Co., Cleveland, Ohio, died Dec. 15 at Chattahoochee, Fla. After his graduation from Case School of Applied Science, Mr. Mullen engaged in railroad construction in Chicago and did some engineering in Ohio coal fields before returning to Cleveland in 1905, when he founded Master & Mullen Construction Co. Twenty-five years ago he founded Florida Sand & Gravel Co. at Chattahoochee.

Henry F. Menne, 60, consulting engineer for the Bauman Associates, Cleveland, Ohio, for about 18 years, died Dec. 11.

James S. Watson, 72, president of the Indianapolis, Ind., Board of Public Works and Sanitation, died Dec. 10 in that city. He retired in 1944 as vice-president of the Link-Belt Co.

Harry U. Mowery, 78, long active in engineering work, died at Wooster, Ohio, Dec. 13. A graduate of Ohio Northern University, he was elected county surveyor of Wayne County, Ohio, in 1892 continuing till 1905, and was later engaged in highway, municipal and appraisal work. He was locating and resident engineer for the Cleveland and Southwestern Traction Co., having built the section from Medina to Ashland, Ohio, in 1906-08.

Joseph Edward Hooper, 54, prominent building contractor of Gainesville, Ga., died Dec. 12. Mr. Hooper was a partner in the firm of Hooper Bothers.

Peter P. Pierce, Sr., 58, retired civil engineer, died at his home in St. Augustine, Fla., recently. He was instrumental in construction of railway extension across the Florida Keys to Key West, from 1909 to 1915.

John Sabo, Jr., 39, a structural steel engineer of Keasbey, N. J., was killed Dec. 18 in a hunting accident in the wilderness near Woodmansie in Burlington County, N. J.

Frederick C. Noble, 74, a designer of the Manhattan Bridge in New York City and an engineer in the construction of New York's first subway system died at Gulfport, Fla., Dec. 17. He was a graduate of the University of Michigan.

Auto clubs plan work for better transportation

Automobile clubs throughout the country are launching intensive programs to bring about major improvements in automotive transportation as the result of decisions reached at the recent annual meeting of American Automobile Association at San Francisco.

The more than 400 delegates from motor clubs in the U. S., Canada, and Hawaii agreed on a program which, among other things, called for: Establishment, in all communities, of an agency with authority and resources to solve the parking problem; establishment in every state of a special committee, representing all groups interested in highway development, to work out long-range highway improvement programs based on road needs, revenue and costs; and adoption of limited-access and roadside protection legislation to make possible the development of the projected 40,000-mile interstate system of high-type highways.

Meanwhile, the delegates authorized A.A.A. national headquarters to resume its battle, discontinued during the war, against federal taxation of gasoline and automotive products, to fight for the principle of confining federal-aid highway appropriations to general purpose roads of national significance.

One of the strong demands was for stopping the trend whereby motor user taxes are being applied for minor local roads. Another resolution called for tightening up rules as to exemptions and refunds of gasoline taxes to prevent "leakages" which, it was charged, have reached "scandalous proportions" in a number of states.

MAJOR MEETINGS

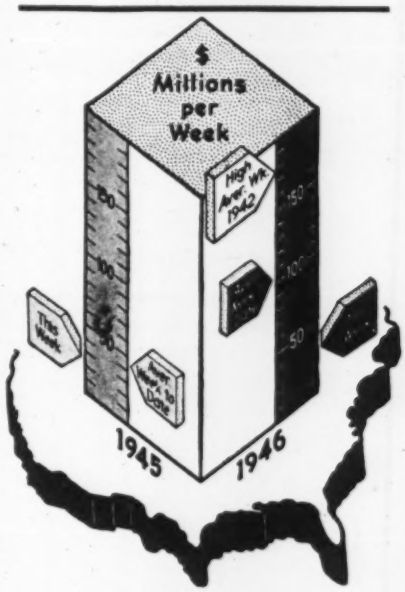
American Society of Civil Engineers, annual meeting, Commodore Hotel, New York, N. Y., Jan. 15-18.

Associated General Contractors, annual convention, Stevens Hotel, Chicago, Ill., Jan. 27-30.

National Crushed Stone Association, annual meeting, Edgewater Beach Hotel, Chicago, Ill., Jan. 27-29.

Associated Equipment Distributors, 28th annual meeting, Edgewater Beach Hotel, Chicago, Ill., Feb. 13-15, 1947.

CONSTRUCTION ACTIVITY



As Reported this week to... *Engineering News-Record*

CONTRACT VOLUME

Continental U. S. Only (Thousands of Dollars)

	Week of Dec. 26 1946	Cumulative 1946 (52 wks)	Cumulative 1945 (52 wks)
Federal	$1,057	$623,535	$750,000
State & Mun.	8,027	1,419,092	395,024
Total Public.	$9,084	$2,042,627	$1,145,024
Total Private	25,260	3,157,671	1,144,384
U. S. Total.	**$34,344**	**$5,200,298**	**$2,289,408**

WHERE CONSTRUCTION ACTIVITY ORIGINATED THIS WEEK

Dollar Volume (Thousands)

Type of Work	This Week	Cumulative 1946 (52 wks.)	Cumulative 1945 (52 wks.)
Waterworks	$761	$109,226	$61,039
Sewerage	523	113,522	34,560
Bridges	1,724	128,671	53,080
Highways	4,389	769,387	227,258
Earthwork, Waterways	957	351,869	56,759
Buildings, Public	514	414,087	462,909
Industrial	12,808	1,113,251	635,170
Commercial ..	11,764	1,846,173	387,273
Unclassified	904	354,112	371,360

NOTE: Minimum size projects included are: Waterworks and waterway projects, $22,500; other public works, $40,000; industrial buildings, $55,000; other buildings, $205,000.

NEW PRODUCTIVE CAPITAL

	Cumulative 1946 (52 wks.)	Cumulative 1945 (52 wks.)
NON-FEDERAL	.....	$774,128
Corporate Securities		201,326
State and Municipal		409,202
RFC Loans	Current	24,600
REA Loans	figures	60,000
Fed. Aid Highway.	not	79,000
FEDERAL	available	1,049,898
Total Capital	.....	**$1,824,026**

ENR INDEX NUMBERS

Index Base = 100		1913	1926
Construction Cost..	Dec. '46	368.10	176.95
Building Cost.....	Dec. '46	278.49	150.54
Volume	Nov. '46	164	72

EDITORIALS

VOLUME 137 NUMBER 26

December 26, 1946

Opportunity Extraordinary

DECISION TO BUILD the permanent headquarters of the United Nations on a site at the east side of Manhattan Island, New York City, presents architects and engineers with an unprecedented opportunity to develop designs that will combine majesty with the utilitarian services that must be provided if the headquarters is both to serve and to symbolize its functions. Rockefeller Center offers the closest comparison to this prospective United Nations headquarters, although the opportunities of the latter are even more extraordinary. Only American architects and engineers were consulted on Rockefeller Center; the United Nations presumably will draw upon ideas from abroad as well. Also, the area occupied by and adjacent to Rockefeller Center was far less blighted than is the United Nations site so that the resulting improvement should be even more notable. All in all, the engineering world can regard the decision to locate the United Nations headquarters in New York as an extraordinary opportunity to set a milestone both in architectural design and in urban redevelopment.

Fire Safety for Hotels

DISASTROUS HOTEL FIRES are unnecessary. No other conclusion is possible from a study of the three hotels in which fires have taken a toll of 200 lives in the last seven months, and none other is feasible on the basis of the Building Exits Code of the National Fire Protection Association available for a good many years. No new lessons were taught by the LaSalle Hotel fire in Chicago, the Canfield Hotel fire in Dubuque or the Winecoff Hotel fire in Atlanta. In each case an open stairway furnished a path for the fire to spread upward and acted as a flue with a powerful draft. In at least one case, the Winecoff, the stair well was covered at the roof offering no escape for the hot gases and smoke, which spread down the corridors of each floor. Open stairways are clearly prohibited in the Building Exits Code and in most modern city building codes. The difficulty is that some city codes do not prohibit them and that even good codes are not required to apply retroactively. In the latter case the worst known fire hazard is allowed to exist. Enclosing stairwells is a simple operation. So is installation of a fire alarm system that reaches every room and a sprinkler system in storerooms and areas not under constant supervision. Likewise fireproof air conditioning ducts and fireproof trim, decorations and acoustical finishes can be installed without difficulty. In most cases the expense is not great, but even if it were it should not be a deterrent. Hotel fire safety is possible. Enclose stairwells. Limit combustible materials just as floor loads are limited. Install alarms and sprinklers. Every city code should include these requirements. And then they should be enforced relentlessly.

For Deepwater Foundation

HOLLOW-PILE foundation techniques developed by the Creole Petroleum Corp. to meet the special needs encountered in Lake Maracaibo oil-drilling operations command attention for possible application in other types of marine work. As described elsewhere in this issue, these foundations consist of hollow-concrete cylinder assemblies that are prefabricated on land and which can be put in place with comparative ease in depths of water up to 100 ft. Quite aside from the obvious use of these foundations for offshore oil drilling in the United States and other parts of the world, they offer a possible new approach to the installation of deepwater navigation aids and other structures such as wharves and bridge piers. Many virtues are associated with the hollow-pile foundation technique. Not the least of these is that conventional construction equipment can be employed for their installation. Furthermore, as most of the units can be made on dry land, the actual time required for marine operations—which are always costly and hazardous—becomes only a minor consideration.

Spillway Energy Dissipation

A NOVEL METHOD for dissipating much of the energy of water pouring over the spillway of a dam was described in the Dec. 12 issue, vol. p. 783. Above a step formed high up on the face of the spillway of Loskop Dam in South Africa to facilitate raising its crest at a later date, numerous equally spaced projections called "splitters" were formed, the tops of the splitters being horizontal. These projecting blocks of concrete serve two pur-

poses; they divide the smooth sheet of water coming down the spillway into separated streams, thus opening up the sheet at many points for entrainment of air, and they also convert into horizontal jets those parts of the sheet that impinged on the horizontal tops of the splitters. Water passing between the splitters, similarly, is converted into horizontal jets where it strikes the step a few feet farther down the face. The end result is to project the whole stream into a foaming mass that falls clear of the dam with so much loss of energy as to produce no significant erosion. The designers used small models for determining the size and spacing of the splitters and ultimately undertook to translate their findings into formulas to be applied to the design of such spillways. These latter will need confirmation by tests on much larger models before they can be accepted. However, this fact in no way detracts from the significance of this work in directing thinking with respect to energy dissipation into new channels.

Housing Enters a New Phase

REMOVAL of price and priority controls on materials and relaxation of rent ceilings merely mark a logical step in the nation's effort to stimulate house construction. Recriminatory charges, on the one hand, that the Wyatt program failed, or on the other that the move represents a retreat from an orderly program to a boom or bust philosophy, are largely untrue and in any event unimportant. President Truman described the situation exactly and completely when he said, "The techniques we will use are those that will work today."

When the Wyatt program was launched a year ago, almost every building material was in short supply. Demands for every type of construction were tremendous. Without price controls and priorities, housing would have fared ill indeed. The logical step, economically and politically, was to aid housing at the expense of other types of construction, including high-cost housing.

Measured as practical accomplishment, the results were not bad. Before the advent of the Wyatt program it was generally conceded that between 400,000 and 500,000 housing units could be built in 1946. About 470,000 conventional permanent type units actually will be completed. In addition 230,000 temporary units were provided. The dissatisfaction with these results arises because, first, the Wyatt goals of 700,000 conventional permanent units and 250,000 prefabricated units were not reached, and second, because the demand for houses still remains high.

The question that recently had to be answered was, could this demand be met better by continuing the controlled program or by returning housing to its normal place in our free enterprise economy? All signs pointed to removal of controls as offering the most promise—to using the techniques "that will work today."

One of the techniques already adopted is basic—separation of the emergency housing administration from the NHA with its long-term objectives. This should help to put housing in proper perspective. From the beginning, it was only emergency housing that deserved special consideration and help. The fact that great numbers of veterans *wanted* housing was beside the point. The nation, including the veterans, also wanted, and even needed, factories, roads, water supply, stores and better sanitation. Housing, except for distress cases, was just another item on the list. From now on, this fact must and will be appreciated.

Another technique is to permit anyone to build a house for himself at any price that he can afford. This brings another facet of the picture into focus, namely that veterans who merely want houses are not a class apart but are co-equals with everyone else. As a matter of fact, this technique, coupled with another, of giving veterans first choice to buy or rent all vacated or new houses, will swell the supply of veterans' housing.

Finally, the technique planned for early 1947 of permitting increased non-housing construction will be salutary in improving the housing perspective. Such facilities as stores, schools and roads are necessary companions of housing, while new factories will swell the supply of products with which to build the houses and make them more livable.

All of these techniques are those that will work today. The future may reveal others to supplement them. They, too, should be adopted, for housing will continue to enter new phases of action continually as we strive to improve and increase it for every economic level of the population.

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Welded Girder Bridge of Composite Design Carries Deck Area of Two Acres

E. W. Wendell
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Albany, N. Y.

***Contents in Brief**—The Erie Thruway will be carried over Cattaraugus Creek, southwest of Buffalo, N. Y., on a 112-ft. wide, welded steel deck plate-girder bridge consisting of five 132-ft. spans. Designed for composite action with the 8-in. concrete roadway slab, the girders are composed of a 66x7/16-in. web and 24-in. flange plates varying from 1 to 3½ in. in thickness.*

ONE of the first all-welded steel bridges scheduled for construction on the New York State system of thruways (*ENR* Dec. 13, 1945, vol. p. 773) will have a deck area of nearly two acres. Carrying the multiple-lane highway over Cattaraugus Creek on the Erie Thruway, about 30 miles southwest of Buffalo, the structure will consist of five 132-ft. long spans, each composed of twelve-deck plate girders with 5-ft. 6-in. webs and 24-in. flanges designed for composite action with the 8-in. roadway slab. The deck, 112 ft. wide, will carry three lanes of traffic in each direction with safety walks along the outer curbs. Each roadway will be 49 ft. wide, 6 ft. wider on each side than the approach pavements, and opposing traffic will be separated by an 8-ft. raised mall (Fig. 1).

Rigid deck-type superstructures with relatively shallow floor depths and open steel railings satisfy the requirements of economy, snow removal, unobstructed vision upstream and down, and pleasing appearance with adequate load-carrying capacity, roadway width and sight distance.

Investigations conducted by the New York State Department of Public Works to determine the relative economy of a 132-ft. riveted girder bridge of composite construction and a welded one led to the conclusion that the welded design not only was sound from a structural and economical standpoint but had certain advantages in appearance. Utilization of the compressive strength of the slab in composite construction increases the economy of course. The entire superstructure will be painted gray-green to harmonize with the surroundings.

Type of crossing required

At the intersection with the highway, Cattaraugus Creek is a winding stream subject to heavy floods and bank erosion, but the channel is being relocated to improve its alignment and flow. The bridge will be built over the relocated channel, square with the stream.

As a result of subsurface investigations made at this site, together with the possibility of streambed erosion, plans call for the use of simple spans for the crossing and for supporting each substructure on cast-in-place concrete piles driven to the required resistance. The slopes of the approach fills will be protected from erosion by a concrete slab laid from the top of the steel sheetpiling, used to safeguard the toe, up to high water elevation and back along the fill to natural ground contours. Because of possible differential settlement of the substructures, continuous-beam construction will not be used for the superstructure.

At this location the highway is straight and rises on a 0.30 percent grade toward the northeast. Extensive embankments are necessary, particularly at the southwest end of the bridge, due to the necessity of establishing clearance over the predictable crest elevation of floods and ice floes. However, the height of the embankments has been kept to a minimum by using shallow welded deck plate girders.

The Cattaraugus Creek bridge was designed in accordance with the specifications of the American Welding Society and of the American Association of State Highway Officials for H-20 S-16 loadings. Its 8-in. thick deck of 1:2:3½ concrete, spanning 9 ft. 4 in. between girders, will be reinforced transversely top and bottom with ⅝-in. round bars, 5½ in. on centers, and longitudinally with ½-in. rounds 10 in. on centers at the bottom, 2 ft. 4 in. on centers at the top (Fig. 1). Above the slab and separated from it by membrane waterproofing will be a 3¾-in. thick 1:1¾:3½ concrete wearing surface reinforced with wire mesh. The pavement in each roadway will slope $\frac{3}{16}$ in. per ft. toward the center mall and outer curbs.

The 60 welded girders are designed to act with the slab as composite beams. To take the horizontal shear, patented spirals of ⅝-in. round bars with 6-in. mean diameter will be embedded in the concrete slab and welded to the top flanges of the girders with 2½-in. long $\frac{5}{16}$-in. welds on each side of the rods. The concrete slab is assumed to have a working strength of 1,000 psi.

Girder details

All girders have 66 x $\frac{7}{16}$-in. webs and flanges 24 in. wide. The flanges will be plates of single thickness, from 1 to 3½ in. thick for the bottom flange and from 1 to 2½ in. thick for the top flange. The complete flange assembly is to be welded together, using full penetration butt welds (Fig. 1), before being attached to the webs by continuous fillet welds varying in size from $\frac{5}{16}$ in. to ½ in. according to

flange thickness. This latter welding is to be started at the centers of the girders and will progress toward their ends with two welders working simultaneously on opposite sides of the webs. It is expected that the girders will be completely shop-welded and erected in one piece, but should this prove impracticable, provision is made for the introduction of one welded field splice in each girder.

The intermediate stiffeners consist of 11 x $\frac{11}{16}$-in. plates and the end stiffeners of 11 x 1-in. plates welded to the web and flanges. The upper ends of the stiffeners are welded directly to the top flange plates. At the lower ends, 4 x $\frac{1}{2}$ x 10-in. fillers are introduced between the flange plate and the stiffeners, and welded to the flange by fillet welds of the same size as the welds connecting the bottom flanges to the web. The stiffeners are welded to the filler plates by fillet welds on both sides of the outstanding end of the stiffener. This arrangement eliminates welds perpendicular to the line of stress in the tension flange of the girders.

Because of the thickness of the plates to be welded, requirements in excess of those for ASTM A-7 steel are specified in accordance with the specifications of the American Welding Society to assure ease of welding. As the thickness of plates increases, there is a tendency for the mills to increase the carbon and manganese content to maintain tensile properties and the yield point, both of which may be lowered due to the slower rate of cooling and lesser hot-working of the thicker materials. However, addition of these elements tends to produce a harder steel, which is more difficult to weld. Therefore, the requirements aim at keeping carbon and manganese to a minimum without sacrificing other desirable properties.

Each span of the bridge is braced by five lines of interior diaphragms and two end diaphragms (Fig. 1). The interior diaphragms consist of top and bottom 3x3x$\frac{3}{8}$ strut angles and two diagonal 5x5x$\frac{3}{8}$ angles welded to the stiffeners. The end diaphragms, also welded to the stiffeners, consist of an 18-in. channel under the top flange and a 3 x 3 x $\frac{3}{8}$-in. angle over the bottom flange. The channels form the support for the end dams, which are welded to them.

Each of the intermediate piers will support the girders on a fixed and an expansion bearing (Profile Fig. 1). Both types of bearing are built up by

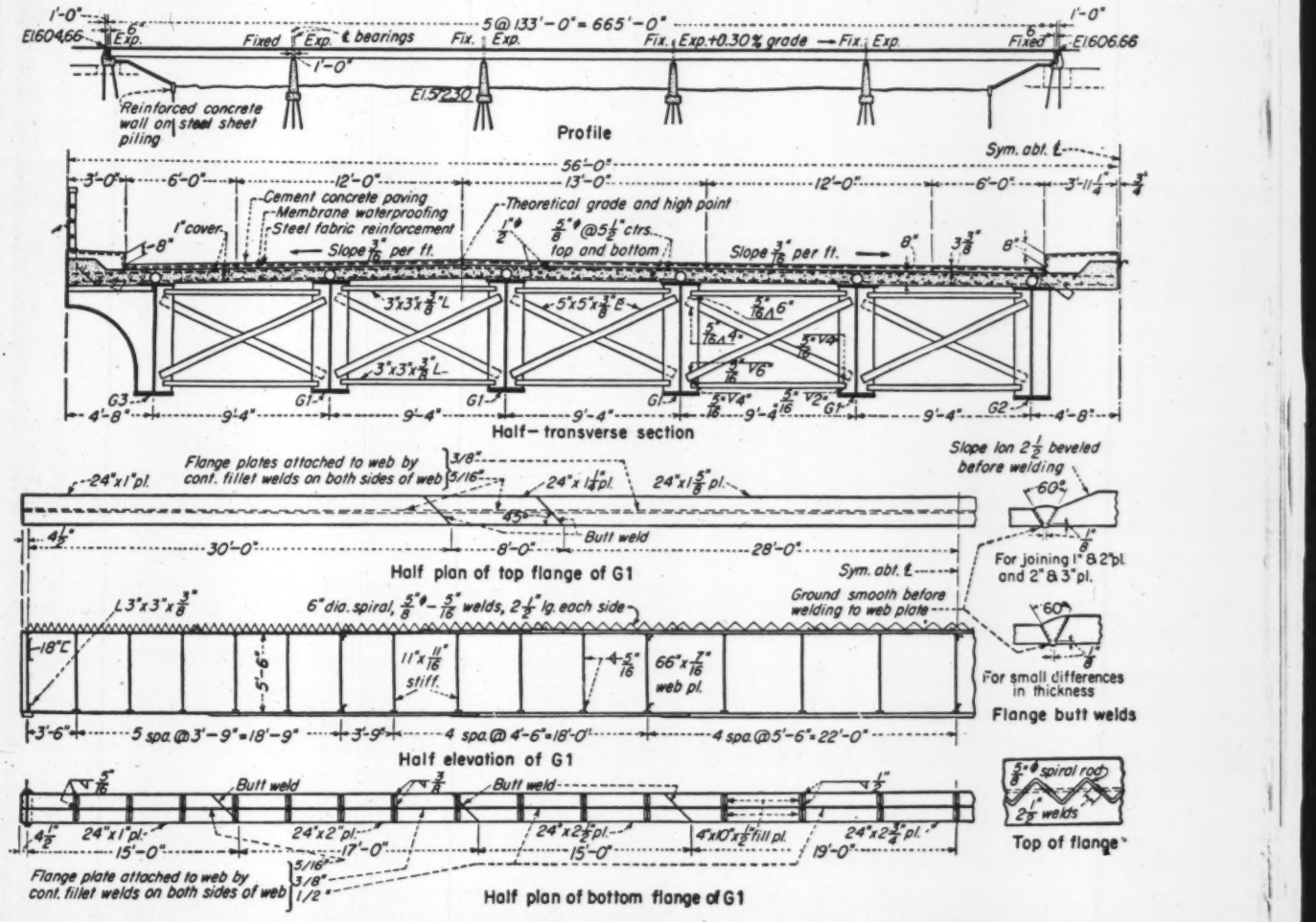

Profile
Half–transverse section
Half plan of top flange of G1
Half elevation of G1
Half plan of bottom flange of G1
Flange butt welds
Top of flange
Reinforced concrete wall on steel sheet piling
Cement concrete paving
Membrane waterproofing
Steel fabric reinforcement
Theoretical grade and high point
Slope 3/16" per ft.
Butt weld
Ground smooth before welding to web plate
For joining 1" & 2" pl.
For small differences in thickness
Flange plate attached to web by cont. fillet welds on both sides of web
5" spiral rod
2½" welds

Fig. 1. The five 132-ft. spans of a 112-ft. wide, 6-lane, welded steel bridge over Cattaraugus Creek on the Erie Thruway will each consist of 12 plate girders, as shown in the half-section. Carrying cantilevered sidewalks, a raised mall and two 49-ft. wide roadway slabs, the girders are designed for composite action with the slab through the use of the patented spiral indicated in the details of girder G1. Flanges up to 3½ in. thick are single plates, butt welded as shown in the details before being welded to the web.

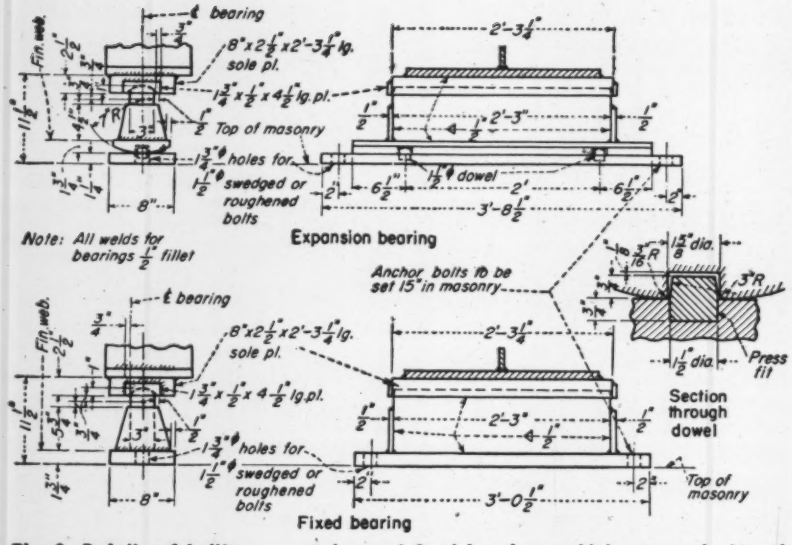


Fig. 2. Details of built-up expansion and fixed bearings, which are used at each pier to support the girders. The expansion pedestal is rocker-type.

welding and permit free rotation of the girder ends, the expansion pedestal being a rocker type (Fig. 2). The interior girders (G1 in Fig. 1) are cambered 3½ in. at the centerline, and the girders at the mall (G2) and the fascia girders (G3) are cambered 4 in.

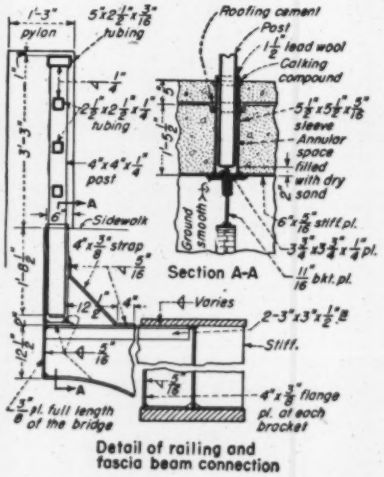
While the corresponding components of G2 and G3 are the same size, the fascia girders are provided with brackets to support the cantilevered safety walks and railing posts (Fig. 3). Acting as stiffeners as well, the brackets are spaced to come under the railing posts and do not line up with the stiffeners on the interior face of the web. For architectural treatment, the ends of the brackets and the concrete fascia of the walks are covered by a steel plate. This ⅜-in. plate, running the length of the bridge is held to the brackets by $\frac{5}{16}$-in. welds.

Carrying three intermediate lines of 2½x2½x¼-in. copper bearing, cold drawn steel tubing and a top rail 5x2½x3/16 in., the rectangular posts are to be shimmed in place in sockets provided in the sidewalk, and these are then to be filled with dry sand, except for the 1½ in. at the top, which will be calked with lead wool (Sect. AA, Fig. 3).

Illustrative design calculations

As an indication of the procedure followed in designing the girders, an outline will be given of the computations for G 1. Three stages were considered: (1) Stringers loaded with 8 in. of green concrete; (2) Live load and 19.5 percent impact; and (3) Additional 3⅜-in. concrete pavement added.

In the first stage, with an assumed weight of girder of 457 lb. per ft. weight of concrete 150 lb. per cu. ft., and a total dead load of 1,390 lb. per ft., producing a maximum bending moment of 36,330,000 in.-lb., there is no bond between the concrete and the steel member so that the stringer section alone carries the full load, as contrasted with the later stages where the concrete acts with the girder. At the cross-section of maximum stress, the center of gravity is 28.66 in. from the bottom of the beam, and the moment of inertia is 126,300. The stress in the top flange is 12,000 psi. and in the bottom 8,240.



Detail of railing and fascia beam connection

Fig. 3. Railing posts are supported on brackets that also serve as outside-face stiffeners of the fascia girders.

In the second stage, with the spiral transferring shear between girder and concrete, the steel section is augmented by an 8x96-in. area of concrete. The maximum live load moment is 37,440,000 in.-lb. With $n = 10$, the center of gravity of the transformed composite section is 45.35 in. from the bottom of the stringer, and the moment of inertia is 2,287,000. The stresses are 4,100 psi. in the top flange, 7,420 in the bottom flange and 541 in the concrete.

In the third stage, n is assumed equal to 30 to allow for plastic flow. The center of gravity of the transformed composite section is 36 in. from the bottom of the girder and the moment of inertia is 5,140,000. For the weight of 3⅜ in. of concrete, 394 lb. per ft., the dead load moment is 10,300,000 in.-lb., thirty times this being used for calculating the steel stresses. The third stage stresses then are 2,070 psi. in the top flange, 2,160 in the bottom flange, and 85 in the concrete.

Final stresses in the steel girder are obtained by simple addition—18,160 psi. in the top flange and 17,820 in the bottom. The stress in the concrete is obtained by vector addition. One vector is the sum of the second and third stage stresses—626 psi. —and the other is the total stress in the concrete as a slab spanning between stringers—802 psi. Thus, the combined stress in the concrete is 1,017 psi.

In determining the stresses at sections other than at midspan, the same procedure was followed. The calculations for the spiral were analagous to those generally used for finding the size and pitch of rivets in riveted-girder construction, as indicated in "Strengthening Our Highway Bridges", by E. L. Pavlo, *ENR* Feb. 26, 1942, vol. p. 339.

Fabrication and construction will be under continuous supervision. Any useful information obtained during the various stages of fabrication and erection of the long, welded girders will be utilized on future work, and highway bridge design thus further advanced.

Prefabricated Caisson Foundations For Submarine Oil Wells

Edward J. Cleary
Executive Editor, Engineering News-Record

● **Building foundations for oil wells in the deep water of Lake Maracaibo posed problems of engineering economics and design. The solution was found in the development of a hollow, concrete pile or caisson, the parts for which lend themselves to mass production and which can be assembled "tailor-made" to suit varied conditions at each location. Virtually the entire foundation is prefabricated at a land base. Consequently, marine operations on the lake, which is subject to severe storms and rough water, are reduced to the point where a 185-ft. caisson can be installed in 1½ hours. The story behind the development, as well as the technical details of its accomplishment, were obtained in a recent visit to the Creole Petroleum Corp. operations in Venezuela.**

FLYING over the northeastern corner of Lake Maracaibo in Venezuela, one sees hundreds of oil wells dotting the surface of the lake. To the civil engineer probably the first question that arises is: "What kind of foundations are used?" The answer unfolds one of the truly dramatic episodes in oil field engineering. And it reflects the greatest credit on the civil engineer whose boldness coupled with ingenuity made possible the tapping of hitherto inaccessible riches in "black gold."

The man is George A. McCammon, precise, positive-acting chief engineer of the western division of the Creole Petroleum Corp. The problem, stated in its simple terms, was to design a foundation that:

(1) could be installed at reasonable cost in water depths of 100 ft.;

(2) was adaptable to mass production;

(3) eliminated exposure of any steel to the corrosive lake waters;

(4) was made of light sections;

(5) could be easily handled by floating equipment;

(6) would minimize work at the site and also permit temporary abandonment of the operation without loss when storms arose;

(7) be adaptable to extreme variations in soil conditions, and finally

(8) be flexible enough to permit use of the same basic elements for the support of various types of heavy, operating installations such as tanks, pumps and drilling equipment.

For five years George McCammon and his staff wrestled with this problem, and in January, 1939, they had the satisfaction of demonstrating the installation of a hollow pile, or caisson-type concrete foundation that met all these requirements. At present more than 200 foundations have been installed and new ones are being added every week. These foundations, which made possible the tapping of flush oil pools below the 100-ft. water depth of Lake Maracaibo, were developed just in time to make a vital contribution to the war effort.

To visualize the foundation, you might think of a scale model consisting of a table top 2 ft. square, supported by four unbraced legs, each about 15 ft. long. The latter might be represented as hollow tubes with a diameter of about 4 in.

The actual foundation consists of a 24 ft. square prefabricated steel derrick platform, with cantilevered wings on opposite sides extending 10 and 15 ft., respectively. This rests on four concrete encased steel shell hollow cylinders. The latter are 5 ft. in outside diameter, have a wall thickness of 5 in. and may have a length up to 185 ft. The caissons are located to form the corners of a square that measures 21 ft., center to center of piles. Connecting the caissons at the top are arched box girders of welded steel, which are clamped to the caissons to form a rigid-frame structure.

It will be recognized that here is reflected a radical difference between the typical concrete pile foundation and the caisson type. Stability of a pile foundation depends upon the use of additional batter piles at each corner to provide lateral strength. The caisson foundation tied together at the top is a true rigid frame and as such eliminates the need for any lateral bracing.

Background of development

Before going into the details of the construction and installation of these foundations, a bit of background is in order to understand the unique conditions surrounding this development.

Lake Maracaibo oil producing operations of the Creole Petroleum Corp. (an affiliate of Standard Oil of New Jersey) are confined entirely to underwater concessions. Shoreline concessions were taken up and operated by other oil companies long before Creole and its predecessor companies began operations in 1923. Economic exploitation, therefore, called for an approach that differed widely from conventional land-drilling and transportation practice.

Shaped like a pear, with the stem

connected to the Caribbean Sea, fresh water Lake Maracaibo is some 115 miles in length and 70 miles wide, or about the same area as Lake Erie. Maximum depth of water is 113 ft. The lake bottom is of sedimentary origin, and it varies from hard, dense clay or sand without cover to hard layers covered by 80 to 100 ft. of soft liquid silt.

The Lake Maracaibo area is subject to electrical and wind storms that can raise havoc with high structures, such as derricks and transmission towers, if they are not securely supported.

Exploitation of oil under the lake has been dependent entirely on progress in the construction of suitable foundations. At first, well-drilling was confined entirely to the shallow shore areas where it was possible to use concrete cast-in-place pedestals to support derricks and machinery.

In 1925, without any precedent in oil-field work as a guide, drilling operations were undertaken in deeper water of 10 to 15 ft., using wooden pile and timber foundations. The wood piles, of untreated and treated soft, as well as hardwoods, failed to withstand the ravages of the teredos, which are very active in the warm waters of the lake. Furthermore, since standard land-drilling techniques at first were employed, a tremendous number of piles were required for foundations for all equipment as well as pipe lines, which made this practice a costly undertaking.

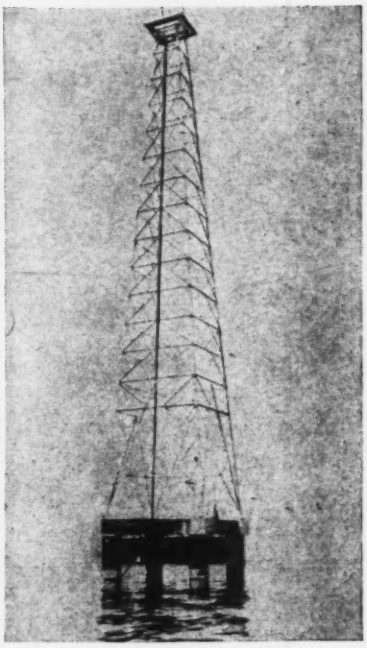


Fig. 1. Oil well in Lake Maracaibo, where water depths of more than 100 ft. are encountered, is supported on four hollow-pile caissons bound together with portal braces to form a rigid frame.

Then followed the decision to employ concrete piles under all structures of a permanent nature. And in 1927 the Raymond Concrete Pile Co. of New York was employed to install foundations for derricks. Each foundation called for 17 piles, a concrete base and a wooden or steel substructure to distribute drilling loads. Around this were grouped auxiliary structures—for steam boilers, pipe racks, etc.—and walkways, all of which required an additional 80 to 100 wooden piles.

Eventually the wood-pile auxiliary foundations were completely eliminated by mounting all the accessory equipment on barges, which could be easily moved from one well location to another. About the same time the pipe lines for transporting oil from the wells to shore storage were placed on the lake bottom, thus further eliminating the need for pile foundations.

"Concrete piles," said Mr. McCammon, "were found to be entirely satisfactory in overcoming high maintenance costs and throughout the years we have found that concrete is the only satisfactory material for resisting both the corrosive action and the marine life in Lake Maracaibo waters."

Having adopted concrete piles as standard, the engineering department of Creole established its own plant for casting the piles. The latter are made in three sizes: 16 in. square up

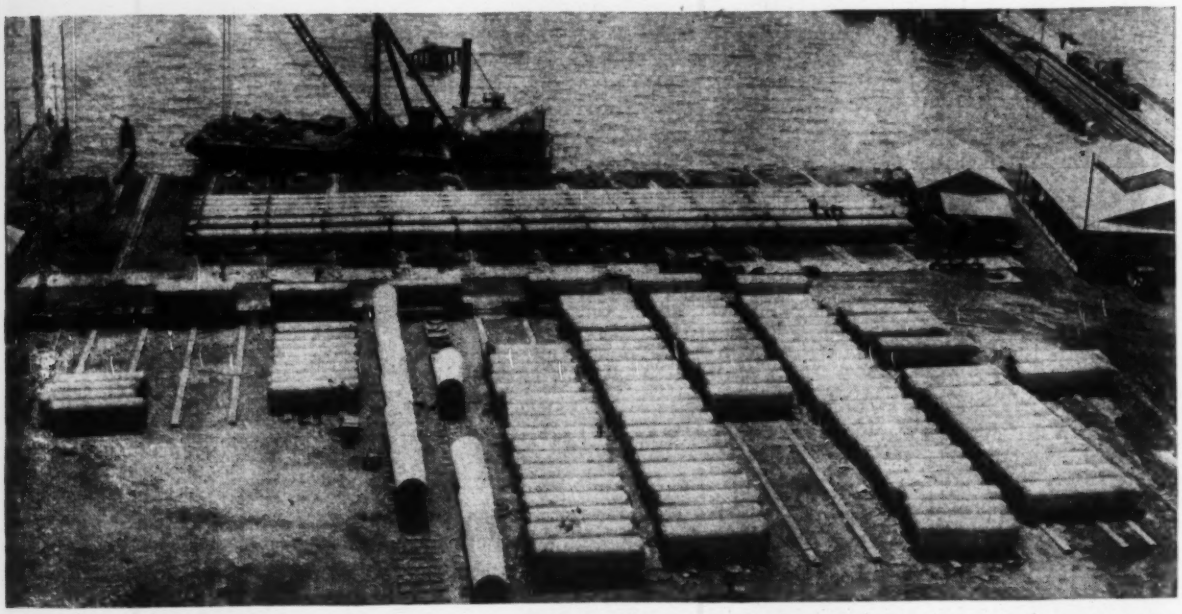


Fig. 2. Caisson assembly yard where 15 ft. sections of steel-lined concrete pipe are joined by welding to form hollow pile up to 185 ft. long. A precast concrete point closes the bottom end (right) and a welded steel plate covers the other end. Consequently the air-tight pipe will float when it is skidded off the wharf into the lake.

to 69 ft. long; 20 in. square up to 99 ft. in length; and 24 in. square in lengths up to 133 ft. long.

Although it is possible to cast extensions on the piles after driving and thus secure an additional 12 ft. of length, neither the length, weight or supporting characteristics of these piles were suitable for foundations when deeper water operations came up for discussion.

Hence, in 1934, studies were undertaken to determine how to build foundations in water depths greater than 60 ft. and where an additional 80 to 100 ft. of soft bottom silt would be encountered prior to reaching clay or sand bottom.

Evolution of caisson design

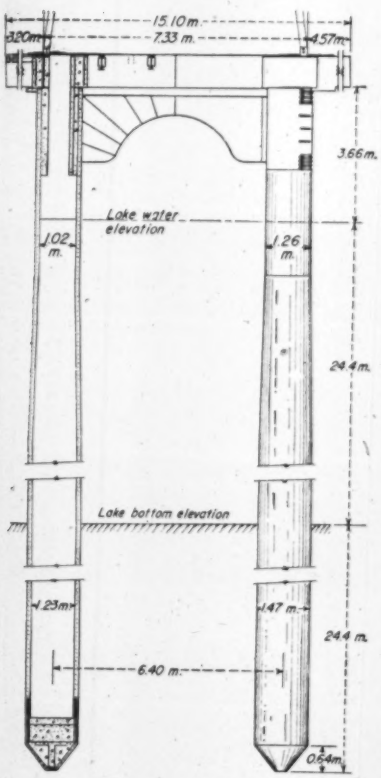
Scores of ideas were developed on paper. From a mass of studies involving all kinds of trusses, girders, and complex structural assemblies to provide longitudinal and lateral bracing, came the conclusion that the member of minimum weight and maximum strength best adapted to this special job would be a hollow cylinder.

What material to use was the next question. This was decided on the basis of experience with the extremely corrosive waters of the lake, which prohibited consideration of steel. This left concrete as the one and only choice.

Inspiration for building 5 ft. diameter hollow cylinders in lengths up to 185 ft. came in part from established practice in the construction of large diameter concrete pressure pipe. It was not difficult to cast 15 ft. length of cylinders. And by using an inside liner of $\frac{1}{4}$ in. steel plates, which also served as the interior form around which the concrete shell is cast, cylinders could be welded together to form a hollow pile of whatever length desired.

Commenting on the use of the liner, Mr. McCammon says: "The inner plate shell was seen to be of value to resist differential pressures between the interior and exterior of the caisson, particularly when stiffened by the concrete encasement. However, we carried out some very crude experiments before we could be sure that the concrete and steel would act together like a conventional concrete member. Use of steel plate without any longitudinal bars simplifies the construction joints."

This, in brief, outlines the evolution of the design of the so-called caisson pile. It is pointed out by Mr. McCammon, however, that refinements in design may be made on the basis of tests now under way in cooperation with the University of Illinois. Data are being assembled



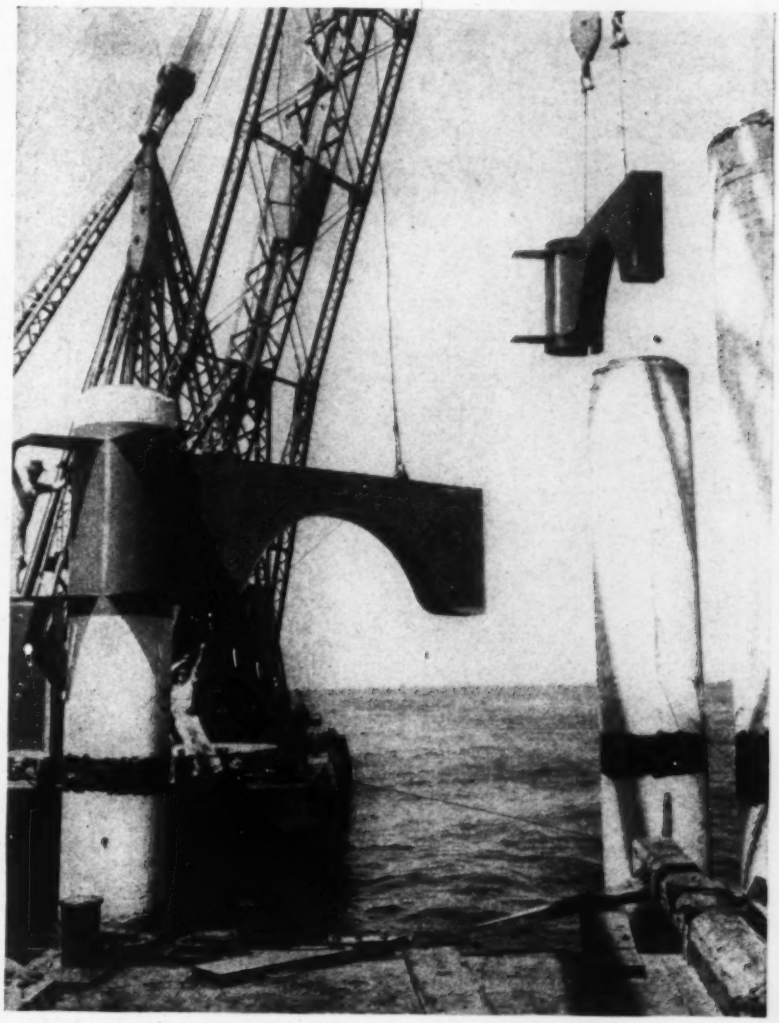
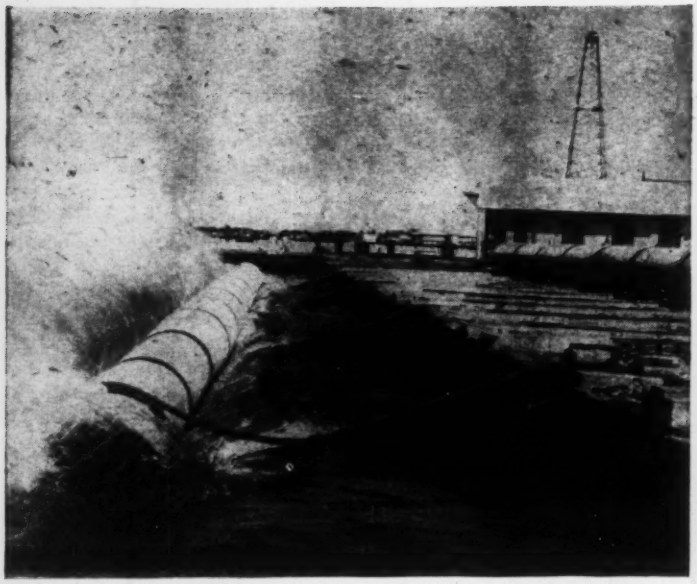


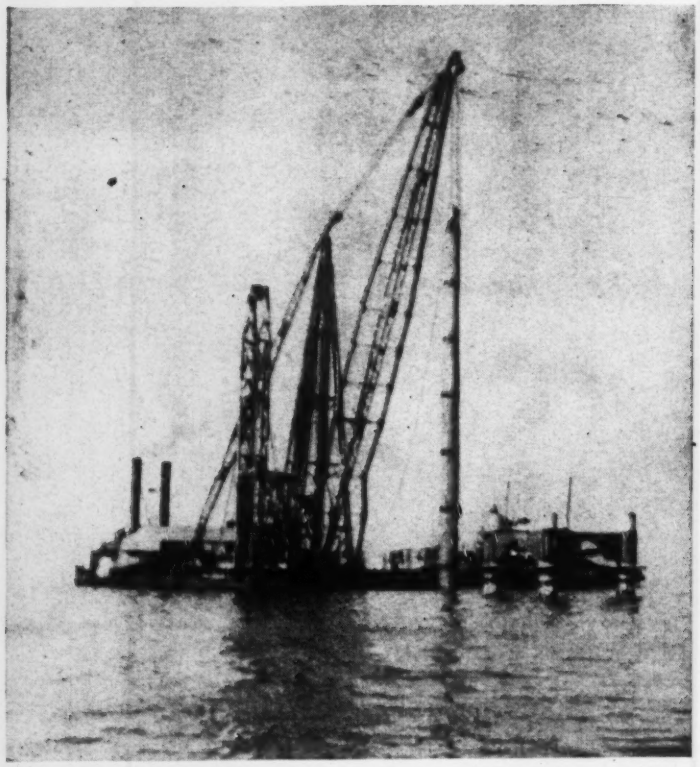
Fig. 3. Schematic representation of half the foundation assembly (left) shows sizes and spacing of the caisson piles as well as the prefabricated portal brace and platform. Photo at the right shows the piles in position and the installation of portal braces.

Standard Oil Co. (N. J.) photo by Vachon

STEP-BY-STEP INSTALLATION



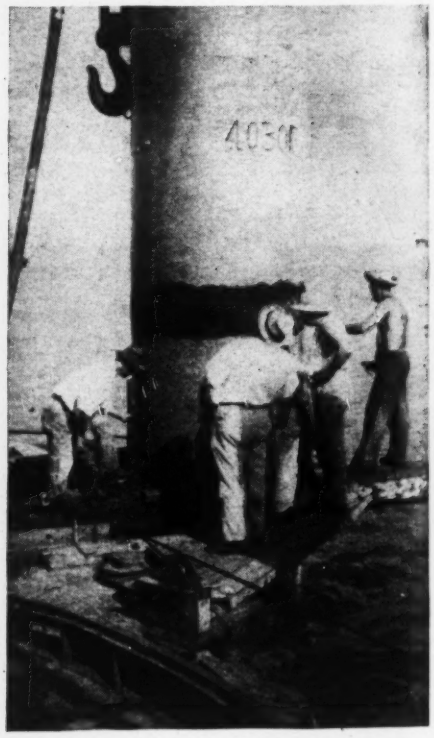
Step 1. Down the skids into Lake Maracaibo goes the assembled caisson to be towed to the well site.



Step. 3. Hoisted up, more than half the caisson is below the water. The derricks barge is then shifted with its anchor lines until the caisson is spotted in position.

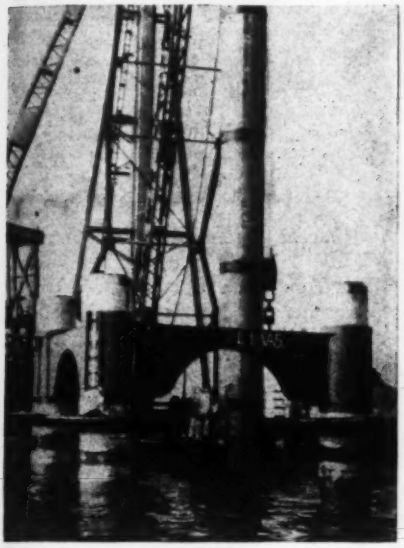
Step 2. One end is picked up on the barge where a nine-part line is attached with a yoke that bolts into the end flange.

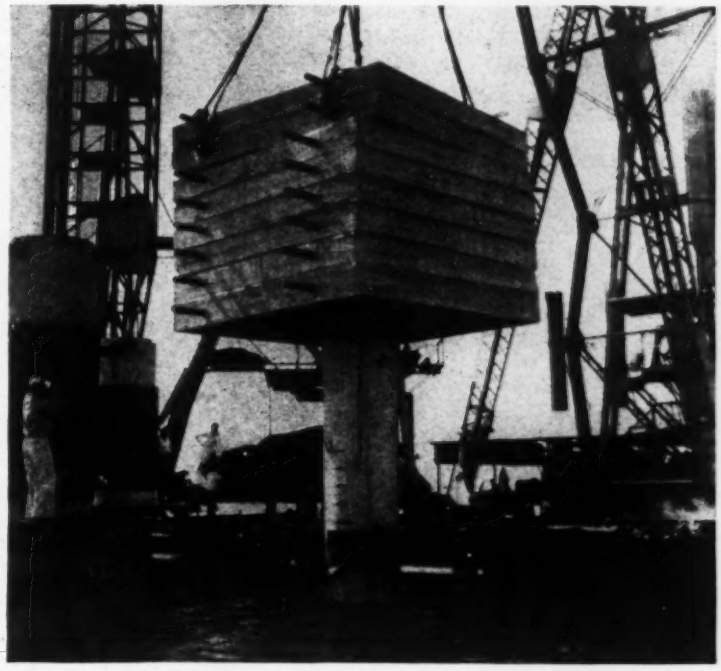
Step 4. Is it in position and plumb? Handlers of steel tapes attached to adjacent caissons, the hand-level man, the barge superintendent and a civil engineer provide the answer.



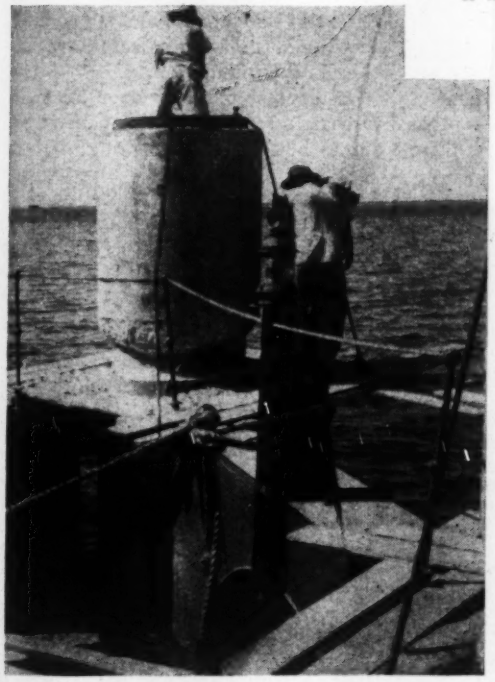
OF A CAISSON FOUNDATION

Step 5. Down she goes as the derrickman pays off slowly. Filled with water when it is in upright position, the total weight of the caisson reaches some 164 tons, which provides good penetration.



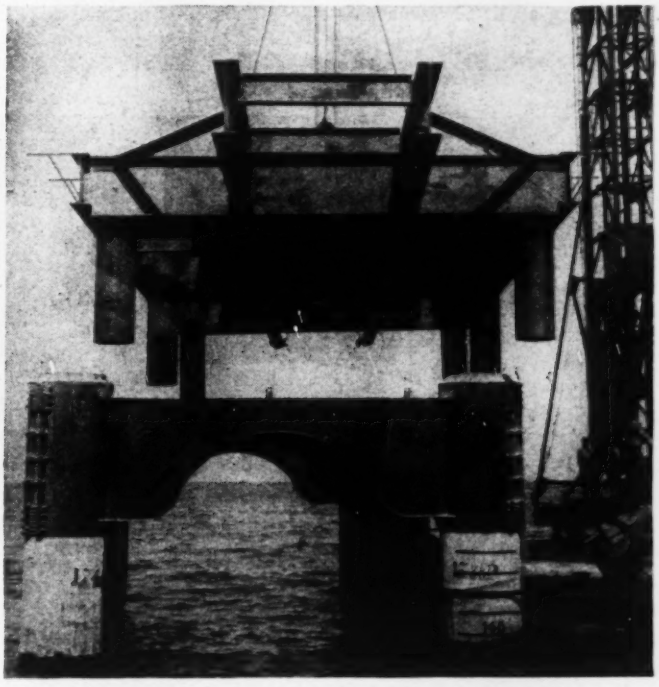


Step. 6. Loaded with 200 tons of precast weights, the caisson pile is pushed down into the firm strata of the lake bottom. The load is far greater than it will have to carry when placed in service as part of the well foundation.



Step 7. Cutting off the caisson to final grade. The pieces are returned to the assembly yard for use in other assemblies.

Step. 8. With portal braces attached, the foundation receives the prefabricated steel base on which the derrick is erected.



in Maracaibo from mechanical strain-gage measurements on a standard foundation under controlled loading conditions.

Engineers in the Creole Petroleum Corp., sponsors of the research, have reason to believe that the piles have a far greater safety factor than is needed, but during the war period there was no opportunity to make the required analytical and laboratory determinations on this score.

Method of manufacture

Details of the manufacturing process, which permits the casting of ten sections daily, include the following pertinent points:

The shell of a section consists of two half-cylinders of ¼ in. checkered floor plate, which are rolled and welded on the site to form a cylindrical section of 15 ft. length. The diameter of these sections is varied to provide for the manufacture of three different sizes of pipe (with outside diameters of 4.17, 4.83 and 5.50 ft. respectively), as well as two sizes with an 8 in. taper. It will be noted that the diameter changes of the pipe are in 8-in. increments, which corresponds with the variation in the tapered pipe. Why this was done will be revealed further on.

To provide additional reinforcement, a spiral cage of ½ in. steel wire spaced on 4 in. centers is placed around the shell. This cage is supported in place—midway between the shell and the outside concrete form—

Fig. 4. For speedy and exact placement of weights, the bottom of each precast unit has a centering hollow, and the tering piece. Each block has a weight of 25 tons, and eight blocks are used for deadloading.

by means of three longitudinal channel-iron spacers. Functioning only as spacers, these channel irons are discontinuous and therefore have no role in providing any longitudinal reinforcement.

Around the reinforced shell, which is stood on end, are bolted the two halves of a steel form. The form is adjusted to permit the projection of 4 in. of the steel shell at both top and bottom, so that these ends are not encased with concrete. The diameter of this outside form is varied so that when it is centered on the shell there is an annular space of 4½ in.

This annular space is filled with concrete while the forms are vibrated electrically. The mix is 1:2:3½, with a slump of 2 in. Test cylinders show that the concrete averages 5,000 lb. per sq. in.

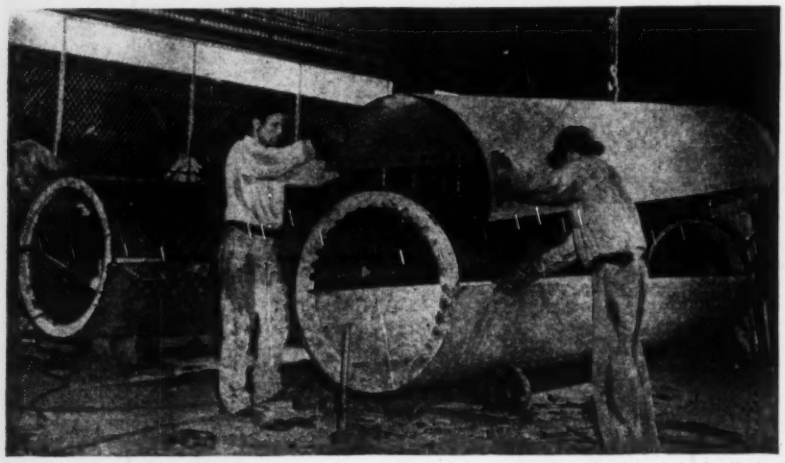
After 12 hours the forms are removed. The 8-ton pipe sections are not moved, however, until two days later, when they are placed in a storage yard; here they are sprinkled with water and kept moist for 7 days. Following this curing period, the cylinders are stored until needed for assembling into caissons.

"Tailor-made" caisson assemblies

Caisson assemblies are virtually "tailor made" for each location, based on water depth as well as the character of the silt and clay bottom. This basic information is obtained with the aid of a 24-in. test pile, one of which is driven at every location prior to caisson assembly.

A typical caisson pile for use where water is below 80 ft. in depth would include six 4.83-ft. dia. pipe sections joined with a tapered section to two lengths of 4.17 ft. dia. pipe. The driving point is attached to the large-diameter end of the caisson. The smaller pipe sections are thus kept in the zone above and below the lake level, and this minimizes wave action on the foundation.

In depths of water over 80 ft. a typical assembly would consist of three bottom sections of 5.50 ft.



Standard Oil Co. (N. J.) photo by Vachon

Fig. 5. Inner liner of the caisson is formed from two half-cylinders of ¼-in. floor plate and then welded along the longitudinal seams. At the right is shown the liner set up in vertical position and around which the spiral reinforcing has been attached with the aid of longitudinal channel-bar spacers.

dia., joined by a tapered section to two lengths of 4.83 ft. pipe, which in turn is joined by another tapered section to two lengths of 4.17 ft. pipe.

Assembly is facilitated by placing the sections end to end on a long skid rack. Since a 4 in. piece of the steel shell projects at each end, there is no difficulty in welding adjacent sections together; first a few tack welds are made and then two or more outside beads are added to complete the joint.

After inspection of the weld a steel form is jacketed around the joint, which is then filled with a low-shrinkage, high early-strength cement.

Generally, ten sections are coupled together along with a precast concrete-point section, to make a caisson pile of 156 ft. length. This point weighs about 4 tons and the hollow pipe sections weigh ½ ton per foot of length. The longest caisson required thus far has been 185 ft.

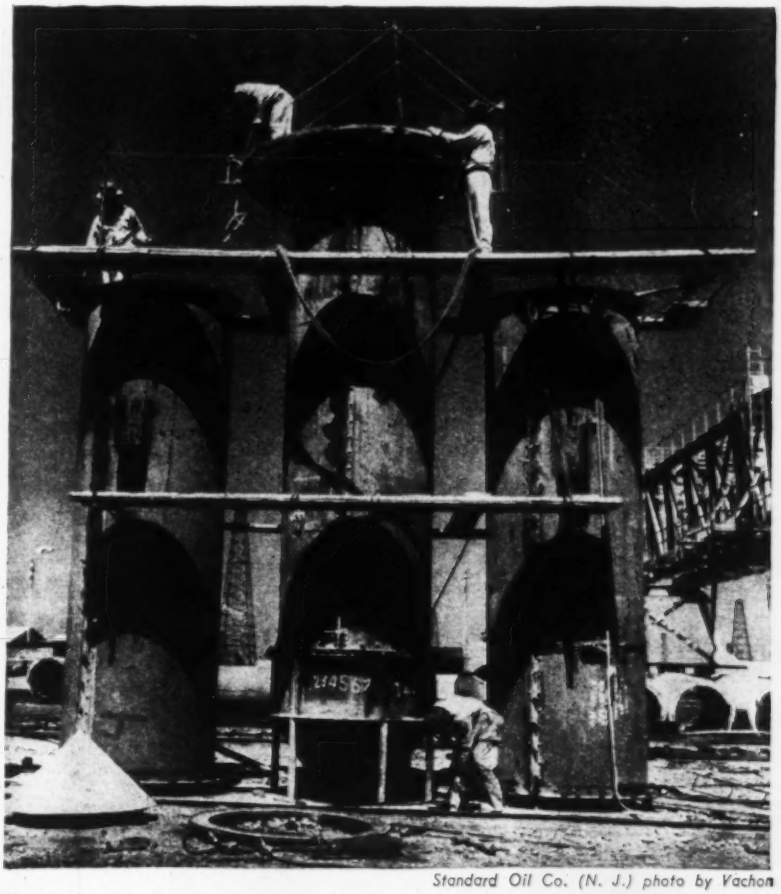
A steel plate welded into the end of the top section makes the hollow pile watertight, and it is then ready for launching. This operation is a simple one, calling only for rolling the pipe from the assembly skids to an inclined platform leading into the lake. Once in the water the caisson floats and can be easily towed to the foundation site, which will be at least 8 miles from the shoreline.

Installation of the caisson

The floating rig for installation of the caissons is a 50 ton stiffleg derrick with a boom of 145 ft. After the location buoy of the foundation has been established by triangulation from two known points on existing foundations, the derrick barge is spotted and held in position with fixed anchors. The latter include four 5,000 lb. stock anchors on 1⅛ in. steel cable and two 2,000 lb. squaring anchors on smaller cable.

After the floating caisson is brought alongside the top end is lifted with a sling to rest across one corner of the barge. Here the nine-part line of the derrick is bolted fast to a ring, which previously had been welded to the inner steel liner. At the same time the steel cover plate that closed the top of the caisson is cut out with an oxyacetylene torch.

A 4-in. water hose is inserted in this open end, and as soon as the



Standard Oil Co. (N. J.) photo by Vachon

Fig. 6. Outside forms, consisting of two half-cylinders, are placed around the spiral-wound inner shell and platforms are provided to facilitate pouring of concrete. The center form is fitted for casting a pile-point section. Note the platform safety cables.

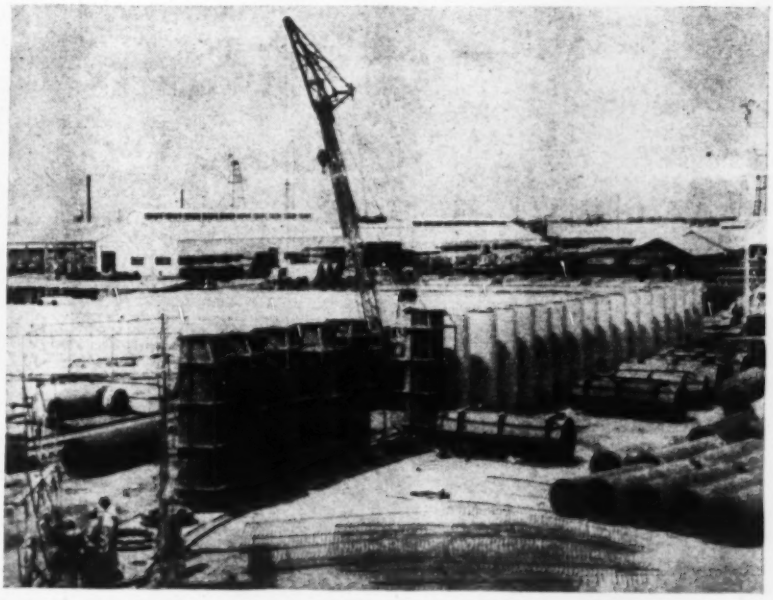


Fig. 7. Casting yard at La Salina, on the east shore of Lake Maracaibo. In addition to making pipe and caisson assemblies, the yard also provides facilities for manufacture of concrete piles and prefabricated steel platforms.

caisson is pulled up to a vertical and partly submerged position, pumping is started to fill it with water. Eventually, some 80 tons of water are added in this fashion.

Now the time has come for the derrick boom to center the vertical caisson into exact position, after which it is lowered away slowly. The deadweight of the caisson (a 156 ft. assembly weighs 84 tons) plus the additional 80 tons of added water overcomes all buoyancy and leaves a good margin of weight to aid in keeping the caisson plumb and to push it through the mud until it penetrates and comes to rest in sand or clay bottom.

At all times control of the sinking of the caisson is in the hands of the derrick operator, who works under the direction of a civil engineer. The latter keeps a hand level on the sides of the cylinder as it slides downward, and any variations in plumb are immediately compensated with slight shifts in the boom position.

Having firmly established the caisson in place—by virtue of its deadweight—with some 20 to 30 ft. sticking above the lake, the derrick line is removed. Then the caisson is loaded with four pairs of precast concrete blocks, each pair weighing 50 tons. These weights are added until the caisson supports a total load of 200 tons. This dead-loading drives the caisson further into the firm bottom, and thus eliminates any doubt as to the load-carrying capacity, or the factor of safety as to future loads.

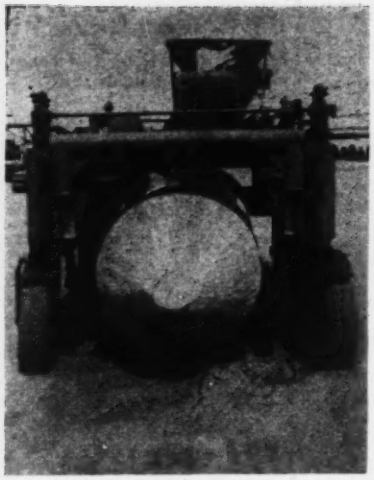


Fig. 8. Skillful use of cutting torch and welder converted a standard Hyster truck into a machine for transport of caisson sections.

The entire operation of lifting, positioning, lowering and dead-weighting a single caisson cylinder is accomplished in an average elapsed time of one hour and a half.

As soon as the first two caissons for a foundation are in place, a portal brace is attached between them. These braces, which establish the rigid-frame type of structure, are arch box girders. They are welded to a cylindrical sleeve that is slipped over the caisson top and then bolted tight to clamp the brace at the desired elevation.

As each additional caisson is placed the braces are attached immediately by means of temporary bolts to make the structure secure against the hazards of storms and heavy wave action. Eventually these girder braces are welded to their adjacent sleeves.

Caissons cut off to grade

Extreme variations in the lake bottom, because of its sedimentary origin, make it impossible to predict the precise length of caisson required. In an extreme case there may be as much as 16 ft. difference in the final elevation of adjacent caissons in a single foundation. In order to provide adequate tolerance cylinders are made longer than is believed to be required on the basis of test pile information. After placing to final position, they are then cut off to grade, the pieces being returned to the yard for use in other assemblies.

A typical oil-derrick and drilling

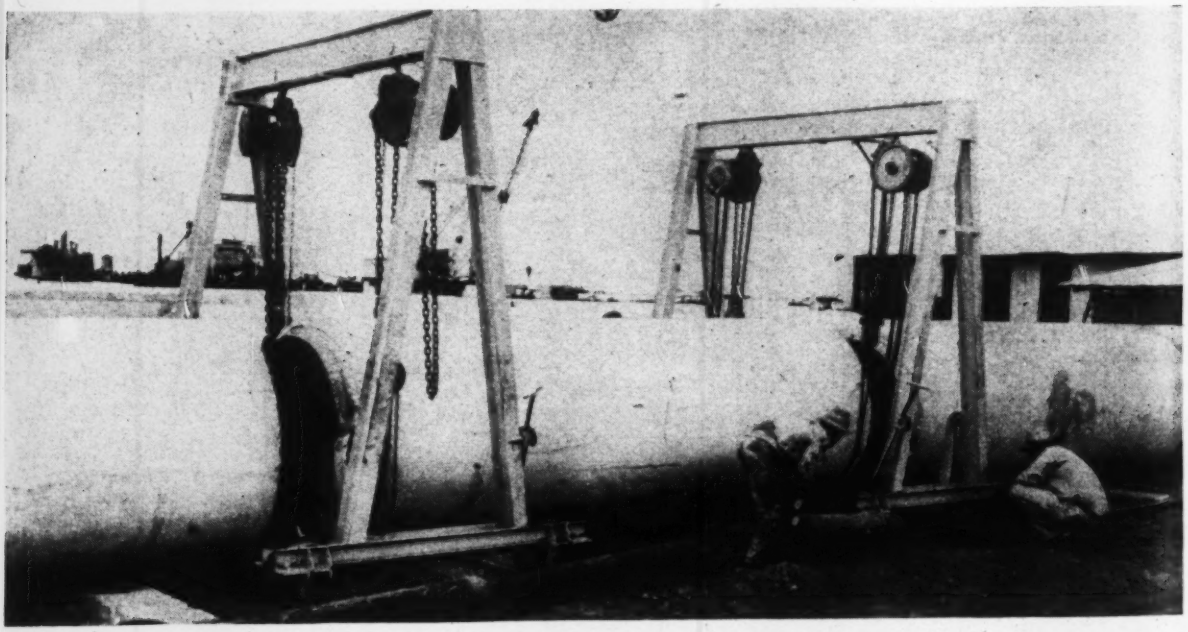


Fig. 9. Chain hoists mounted on mobile A-frames facilitate the operation of welding pipes together to form a single caisson pile. The latter is assembled parallel to the shoreline so that it can be rolled over and skidded into the water.

foundation consists of four caisson cylinders on top of which is placed a 25-ton prefabricated steel platform. The latter is fitted with four legs of 24 in. steel pipe, which extend 6 ft. into the open caisson and help to anchor the base.

The caissons are not filled with concrete. But they are sealed-off with a welded steel plate. This air-tight seal arrests the possibility of any corrosive action from water on the inner steel lining since corrosion cannot take place without the presence of oxygen.

This seal plate in the caisson is placed approximately at the reaction point of the lower flange of the portal figure (see Fig. 3). Then annular space between the caisson and the 24-in. pipe legs (these legs extend down to the seal plate) is filled with concrete in a continuous pour. Thus the concrete extends up to and around the base beams above the tops of the caisson to tie all of the elements together. The concrete also acts as a stiffener for the concentrated reaction from the portal.

No effort is made to cut the cylinders to a precise level for the base: neither are the portals exactly level because they are rigidly welded to a sleeve at one end, which must be parallel to the long axis of the cylinder it encloses. Therefore, each portal is set to the level of the free end of the last one put in place, and the fourth portal is not prewelded to a sleeve but is inserted between the first and fourth sleeve and takes up any difference in level. When the prefabricated base is put into position it is leveled with jacks and shims and then held in place by the cast-in-place corner caps.

Virtues of caisson foundations

In discussing the applicability of caisson foundations to the special needs of the Creole Petroleum Corp. operations, Chief Engineer McCammon enumerated the following requirements which are met:

(1) Hollow cylinder caissons lend themselves to quantity production. The design is sufficiently flexible to cover a wide range of field conditions, and by interchangeability of parts and sections it provides a standard rather than an individual site design with varying construction. This is accomplished by (a) using the same standard structural steel base for these foundations as is used on the concrete pile foundations, and (b) employment of standard steel portal braces, which can be used at any location, regardless of water depth and soil conditions, and (c) use of short, standard caisson sections, which can be readily assembled into any desired length.

Fig. 10. George A. McCammon, chief engineer of the western division, Creole Petroleum Corp., who guided development of the hollow-pile caisson.

(2) These concrete caissons can be readily installed by means of conventional construction equipment. All of the equipment had previously been in service in the construction of the concrete pile foundations.

(3) Safe load-carrying capacity is readily determined. By dead-loading the caissons into final position as part of the construction routine, it is known what the safe derrick capacity is at each location before it is actually loaded.

(4) They provide a safe submarine foundation (water surface to bearing) of 200 ft. in water depths up to 100 ft. All data available at present indicate that depths beyond that will not be encountered in the waters of Lake Maracaibo.

(5) All parts coming in contact with the water are corrosion-resistant. It is to be noted that the concrete shell is the only portion of the structure exposed to the corrosive action of the lake water.

(6) Because of the difficulties encountered in working over water, critical work and construction time at the location is reduced to a minimum. This is accomplished by assembling all units possible on land before moving them to the location. For example, the cylinders are completely assembled on land; the steel portals, too, are also complete units and are welded to the caisson collars in the field. And finally, the structural steel bases are prefabricated on land and set on the location as one unit.

(7) Because of the sudden storms common to Lake Maracaibo, the foundations can be temporarily abandoned at any time during construction. This has actually occurred several times during various stages of the construction and in all cases it was possible to move the equipment away from the site during the storm without damage to the partly completed structure.

(8) The structure lends itself to rapid completion without excessive delay in testing for depth of foundation. By testing the location with a pipe driven with a pile driver, the firm strata in which the points of the caisson will be landed may be determined. With this data the caissons can be assembled to meet anticipated conditions. Thus, locations can be equipped with foundations in a minimum of time after a decision is made to drill them.

Finally—and of greatest importance—the cost is low enough to make the operation economically attractive. Says Mr. McCammon: "While we know of no other marine-drilling foundations constructed for similar conditions with which to make a cost comparison, estimates indicate that no other type of foundation with such flexibility could be constructed at less cost. The fact that once it is in place it requires practically no maintenance attention, is a factor that greatly reduces the foundation cost for the well."

The job and the men

Development of the hollow-pile foundations began as a project of the Lago Petroleum Corp., which was absorbed to become the western division of the Creole Petroleum Corp. E. E. Peake is the division manager and George McCammon is chief engineer.

J. B. Pendleton, assistant chief engineer, has been in charge of field construction operations since their inception.

Dynamic Pile-Bearing Formula With Static Supplement

W. H. Rabe
Assistant Chief Engineer of Bridges,
Ohio Department of Highways,
Columbus, O.

***Contents in Brief**—Pile-bearing formula progressively perfected by five years research and experience. Static supplement to a dynamic formula takes account of ultimate static resistance of the pile. Evaluation of factors based on test records of 187 test-loaded piles covering a wide range of conditions.*

A PILE-BEARING FORMULA and a hammer-size formula developed by the writer and having proved advantages in accuracy are here offered for the consideration of engineers. The pile capacity formula has been in process of development for several years. It was first published in *Engineering News-Record*, Dec. 18, 1941. It has since been revised each year, as additional data could be verified and analysed, until in 1945 it was given the form shown here and designated the B-45 formula. Also, a hammer-size formula has been added.

Limited space curtails publication here to but little more than statements of the formulas and the definition and evaluation of the factors. Discussion and comparison with other formulas contained in the article (*ENR*, Dec. 18, 1941) on the 1941 formula have been developed much further and materially strengthen the position of the 1945 edition of the formula as a useful tool for engineers.

Pile capacity formula

The formula (factor D applying only in case of battered piles) is as follows:

$$R = \frac{M F D}{S + C} \times \frac{W}{W + \frac{P}{2}} \times B$$

The factors are:

R = Working capacity, in lb. (With a factor of safety of approximately 2)

M = A value, in inches per foot, which takes into account the usual efficiency of the type of hammer, assuming that the hammer is in good working order:
4.0 for drop hammers which drag the hoisting line
4.75 for drop hammers released by a trip
5.0 for single-acting steam hammers (Vulcan type)
5.25 for differential-acting steam hammers (Vulcan type)
6.0 for double-acting steam hammers (McKiernan-Terry type)

F = WH for drop hammers and single-acting steam hammers, in foot-pounds, or the manufacturer's rated energy of hammer for differential and double-acting, in foot-pounds.

S = Penetration, in inches per blow (average of last blows)

C = A compression loss term, in inches, hereinafter described in detail

W = Weight of striking parts of hammer, in pounds.

H = Height of fall of striking parts, in feet.

P = Weight, in pounds, of pile (and/or pile apparatus, including driving cap) as it is constituted when the critical S measurement is made.

B = A factor which provides a static influence, hereinafter described in detail.

Compression loss C

The compression loss C is the sum of the temporary compression loss C_1 in the cap and cushion; the temporary compression loss C_2 in the pile and the assumed temporary compression loss C_3 in the soil, or

$$C = C_1 + C_2 + C_3 \text{ in inches}$$

$$C_1 = \frac{R' \times \frac{W + \frac{P}{2}}{W}}{6{,}000{,}000 \times B} \times \frac{H}{3}$$

The $H/3$ term needs to be evaluated for drop hammers only. For single-acting and for differential or double-acting hammers it may be considered as 1 ft.

$$C_2 = V R' L \div AE$$

$$C_3 = 0.04 \text{ in.}$$

For ordinary cases C may be assumed as 0.15 in. for single-acting and double-acting hammers and 0.25 in. for drop hammers. An "ordinary case" is one where the numerator factors of C_1 and C_2 are relatively small and the denominator factors relatively large. In every case it would be best to compute C_1 and C_2 for several stages of driving and thus avoid the need for guessing if the approximate value of 0.15 in. (or 0.25 in.) would be adequate. This is particularly important if the value of S is relatively small.

If the pile rebound and soil rebound subsequent to a blow of the hammer are determined by observation in the field, the value of $C_2 + C_3$ may be considered as one-half the measured rebound. However, if the reading is taken at a point along the pile appreciably below its top, allowance should be made for the additional value of C_2 for the upper portion of the pile. In case of field observation the readings must be made with great care as the rebound is usually a small fraction of an inch.

Table I gives values for factor V in the C_2 equation. The purpose of V is to cause a fractional part of L to be applied and also in case of a tapered pile an appropriately greater cross-section value than A if point bearing in driving, as per classification (1) of the table, does not occur. An interpolated value of V will be used if the soil arrangement is not quite as described in the listed classifications.

The rate of taper of a fully tapered pile is the total length in feet (from the point up to the top which is in contact with the hammer) divided by the difference (in inches) between the diameter at the top and the diameter measured above the shoe or above an abrupt taper at the point. The rate of taper of a partly tapered

pile will be determined as follows: (a) In case of a rather abrupt taper at the end, as at the point of the usual precast concrete pile, such taper will be disregarded and the pile considered non-tapered for its entire length. (b) In case of a longer part taper, the length of the upper non-tapered portion plus two-thirds of the tapered portion in feet will be divided by the difference in inches between the diameter at the top and the diameter at one-third the length of the tapered portion, measured from the point. In a border-line case involving a and b, the average value of V as per a and b should be used.

Explanation of the remaining factors in the equations for C_1 and C_2 follows:

R' = Estimated bearing capacity, in pounds. Although the capacity assumed for R' need not be exactly the same as that derived for R, it preferably should not differ by more than 5 percent.

L = Length, in inches, of the pile (or the pile apparatus) during driving, from the hammer down to the point.

A = Average equivalent homogeneous cross-sectional area, in square inches, of the pile (and/or the pile apparatus) as it is constituted while being driven.

By "average" is meant the weighted average of all the sizes of cross-section between the driving cap and the point. By "equivalent homogeneous" is meant that in case of a combination of concrete and steel, the cross-sectional area of the one (the steel in case of precast concrete and the concrete in case of steel-H with filler over a portion of its length) should be transformed into an equivalent of the other, in proportion to their moduli of elasticity, and added to the actual area of the other. The sum of the two will then be considered as that many square inches of the latter. Where a steel-H pile has concrete filler over a portion of its length, or where the reinforcing steel in a precast concrete pile varies, or where the wall thickness of a driven shell or pipe changes at a splice, the average area will depend upon the relative length over which each section applies. By "pile apparatus" is meant such a device as a steel mandrel used for driving a shell. By "as it is constituted while being driven" is meant that the average cross-section subjected to driving at the time the pertinent penetration is reached should be evaluated rather than that which would apply after a mandrel has been withdrawn, a shell filled with concrete or a pile cut off.

E = Modulus of elasticity of the pile material represented by A, in pounds per square inch. (In the absence of a more accurate value, this may be assumed as 30,000,000 for steel, 3,000,000 for concrete and 1,500,000 for timber.)

$D = \dfrac{1 - UG}{\sqrt{1 + G^2}}$, in which,

U = Coefficient of friction, which is assumed as 0.05 for double-acting and differential-acting, 0.1 for single-acting, and 0.2 for drop hammers.

G = The rate of batter (1/3, 1/4, etc.)

B = The product obtained by multiplying together the following four influencing factors: Soil Factor (B_S) × Pile-Type Factor (B_T) × Pile-Length Factor (B_L) × Pile-Cross-section Factor (B_C).

The suggested soil-factor (B_S) values for the penetrated clay, silt, sand and gravel are:

Very wet plastic clay or silt	0.3
Soft clay on silt	0.5
Medium clay or silt	0.7
Hard clay or silt	0.85
Dense sandy silt	1.0
Loose sand or sand and gravel	0.85
Moderately compact sand, or sand and gravel	1.0
Very compact sand, or sand and gravel	1.25

Usually the value is determined by interpolation between these listed values. If wet clay or silt is known to have good adhesive quality, the value of B_S may be increased above that suggested but not by more than 25 percent. The suggested B_S values for other penetrated soils are as follows:

Shale	1.0 to 1.5 (depending on quality)
Hard Pan	1.0 to 1.5 (depending on quality)
Muck	0.2 to 0.35 (depending on degree of compaction)
Loam	0.2 to 0.5 (depending on degree of compaction)

The value of B_S should not be increased because of contact with solid rock. The additional support provided by the contact with the rock is considered as adequately reflected as a result of the small value of S. Only the soil above the rock will be considered in evaluating B_S. This has a conservative tendency which is considered desirable in most cases, since the contact of the pile's point and the rock cannot be inspected.

Where the soil is all of one kind for the entire penetrated length of the pile (an unusual condition) the soil factor (B_S) to be used in determining B is easily decided. But where several different strata of various thicknesses exist it is necessary to estimate what the weighted, overall, average soil factor is, giving more weight to the soil at and near the point than to that above. To assist in making such an estimate the following method is provided:

1. Study the soil log and decide the soil-factor value for each kind of soil for the full depth of penetration.

2. Divide the log into strata of equal thickness (say from 4 ft. to 20 ft. depending upon the total penetration) and determine a stratum factor for each, giving properly-balanced weight to the kind of soils contained within each such equal depth interval.

3. Multiply each such stratum factor by a progression number (hereinafter described), beginning with

Table I—V values to be used in calculating compression loss in the pile in the equation C_2—$VR'L \div AEB$.

Vertical arrangement of soil with reference to the center of Resistance-to-driving	St. H with Fill at or near point	Non-tapered	Taper 1 in. in more than 20 ft.	Taper of 1 inch in 20 ft.	16 ft.	12 ft.	10 ft.	8 ft.	6 ft.	4 ft.	2 ft.
(1) Point bearing. Rock or other hard material at point. Poor overlaying soil	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
(2) Rock or other hard material at point. Fairly good overlying soil	.95	.95	.95	.93	.92	.91	.9	.89	.88	.87	.86
(3) Rock or other hard material at point. Very good overlying soil	.9	.88	.85	.82	.79	.76	.74	.72	.7	.68	.66
(4) Abrupt increase in firmness of soil near the point but not reaching rock or other very hard	.88	.8	.75	.7	.66	.62	.58	.55	.52	.49	.46
(5) Uniform firmness for full penetration, either soft, medium or hard	.85	.75	.7	.63	.57	.52	.48	.44	.4	.36	.32

Table II—Values for *N* and *J* factors in hammer-size formula.

Type of Hammer	Minimum *F*		Maximum *F*	
	N	*J*	*N*	*J*
Double or differential-acting	0.16	1.2	0.4	1.8
Single-acting hammer	0.18	1.2	0.45	1.8
Drop hammer	0.3	1.4	0.8	2.2

number 1 for the topmost stratum. Add these products (down to the penetrated depth for which the overall B_S is desired) and divide by the sum of the corresponding progression numbers. The quotient is the B_S to be used unless a lower value is indicated as per paragraph (4). The progression numbers to be used, beginning with the uppermost stratum and progressing downward, are: 1, 4, 8, 12, 17, 22, 28, 34, 40, 46, 53, 60, 67, 74, 81, 88, 95, 102, 109, 116.

4. After the overall B_S down to the point of the pile has been determined, the soil log below the point should be studied to see if the soil *immediately* below the point would be assigned a lesser soil factor value than that just determined. If so, the B_S that is used should be the average of these two values.

Usually, one can examine the soil log down to the point of penetration under consideration and (with the governing principles in mind) estimate the B_S value without carrying out the foregoing detailed analysis.

It is merely intended that the B_S value be substantially correct. If a reliable soil log is available, the engineer can use the formula successfully by merely estimating whether the overall, weighted-average quality of the soil down to the point of the pile is:

Very poor	B_S = 0.25	(a very rare and extreme classification)
Poor	= 0.5	(an occasional classification)
Fairly good	= 0.75	(frequent)
Very good	= 1.0	(occasional)
Excellent	= 1.25	(rare)

Usually the value would be determined be interpolation between these values.

Pile-type factors

Unless a factor value is listed or implied to allow for the influence of some peculiarity of a particular type of pile, the value of the pile-type factor (B_T) is 1.

In case of timber piles of imperfect shape driven into hard soil not readily remoldable, to allow for the probability that the imperfect shape disturbs the previously-made contact with the soil, the pile-type factor is 0.9 to 1.

In case of steel-H piles, to allow for the possibility of imperfect contact of the soil with the full periphery of the pile the B_T value is:

With short concrete filler, in cohesive soil	0.75 to 0.85
With medium to long filler, in cohesive soil	0.9 to 1.0
With short concrete filler, in granular soil	0.9 to 0.95
With medium to long filler, in granular soil	0.95 to 1.0
Plain steel-H without filler, in cohesive soil	0.95
Plain steel-H without filler, in granular soil	1.0

In case of fluted steel casings of which the casing itself must resist earth pressure during driving, to allow for horizontal contraction during driving (with resultant deeper penetration per blow) and also some subsequent expansion, a value of B_T depending upon the length of penetration and quality of soil is determined according to the following empirical formula:

$$B_T = 1.0 + \frac{L_P B_S}{500} \text{ but not more than } 1.15$$

In which L_P is the length of penetration, in feet. (A value as great as 1.15 would rarely occur.)

The values of the pile-length factor (B_L) and the pile cross-section factor (B_C) are shown by the graphs Fig. 1 and Fig. 2. For a plain steel-H pile the square inches of cross-section should be assumed as twice the actual, in the determination of the B_C value, since B_C is intended to account for friction surface area as well as actual displacement. The average horizontal cross-section is defined as the volume of displacement in cubic inches divided by the length of penetration in inches.

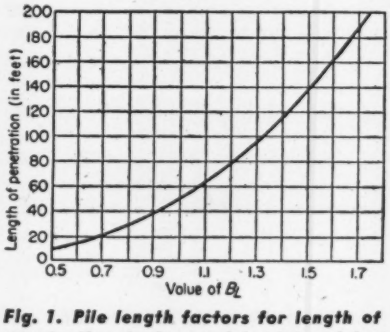


Fig. 1. Pile length factors for length of penetration to be used in determining value of B.

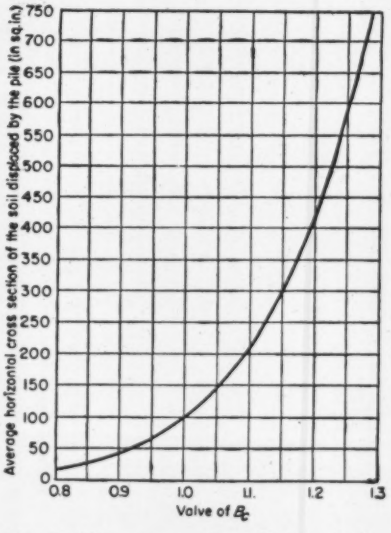


Fig. 2. Pile cross-section factors to be used in determining value of B.

Hammer-size formula

A hammer-size formula developed in conjunction with the pile-capacity formula is:

$$F \text{ (or } WH) = \frac{N \times C \times R}{B(1 - J) \times \frac{\frac{P}{2}}{W + \frac{P}{2}}}$$

Values for factors N and J are given in Table II. The H for drop hammers should not be more than 10 ft. and preferably not more than 7 ft.

It is intended that the "Minimum F (or WH)" (Table II) represents substantially the smallest size of hammer that should be used. The use of a smaller size will result in tedious penetration and in strain on the driving equipment, and will also tend to magnify inaccuracies in the pile-capacity formula.

The "Maximum F (or WH)" is intended to indicate a size of hammer that not only would be extravagantly large but would cause such rapid penetration that the displaced soil might temporarily become congested around the surface of the pile, produce extreme pressure and cause high internal stress in the pile and perhaps temporarily too small an S. If such a too-large hammer is used and causes damage to the pile, its operation should be stopped at intervals

so that the total time of penetration will be approximately the same as if a proper size of hammer had been used.

The hammer-size formula includes the driving-loss terms of the pile-capacity formula and is based, in brief, on the following reasoning: (1) The greater the C, the greater must be the F or WH in order to absorb the compression loss and have sufficient surplus to cause the pile to penetrate. (2) The greater the R, the greater must be the F or WH to provide the static properties (length of penetration, etc.) which produce an R of the desired magnitude. (3) The greater the P, the greater must be the F or WH in order to introduce a larger W to avoid an unfavorable inertia term or to offset the handicap of an unfavorable inertia term by the magnitude of the F or WH. (4) The smaller the B, the greater must be the F or WH because the conditions which cause a relatively small B are accompanied by relatively difficult penetration in proportion to the small R attained and call for more driving power to increase the penetration and thus increase the B factor itself.

Discussion

The formulas given have been presented as briefly as possible consistent with a presentation of working data necessary to implement their use. Argument in support; comparison with other formulas; consideration of group piling, and many other pertinent particulars are outside the scope of presentation.

The pile-capacity formula is the result of trying a considerable number of variations of terms, comparing the resultant R for test-loaded test piles with the capacity as determined from the settlement due to loading, and observing which combination of term evaluation gives optimum results for all of the test cases. This was done on 77 Ohio-state-highway test cases, all vertical, singly-loaded piles, and 110 other-than-Ohio tests of which 93 are vertical, singly-loaded piles and the other 17 are battered piles or group tests.

A very wide range of conditions is represented. The value of R varies from 24,000 to 261,000 lb. For single-acting and double-acting hammers the value of WH (or F) varies from 5,000 to 37,500 ft.-lb., S from zero to 1.5 in., C from 0.08 to 0.72 in., and W from 1,500 to 14,000 lb. The value of P ranges from 700 to 75,000 lb., B_S from 0.3 to 1.2, and B from 0.25 to 1.45. The types of pile are timber, precast concrete, steel-H (with and without filler), pipe, Union Metal, Raymond and McArthur, ranging in penetration from 11 to 192 ft.

Most of the test loads were carried to failure of the supporting soil. Capacity determination on the others was based on the assumption that for the tonnage immediately preceding failure the *net* settlement (after removal of the load) is 0.25 in.

The validity of the capacity formula is based mainly on the relatively consistent agreement of its R with the bearing capacity (one-half of the load at failure) determined from test loading. Besides, a step-by-step analysis will show that it takes into account apparently all important influences due to the properties and behavior of the pile, the hammer and the soil. The B factor is a static supplement to an otherwise dynamic formula.

Most engineers have relied on a dynamic formula for capacity determination while some have used and advocated a static-friction method.

The formula given combines the advantages of both.

In a purely dynamic formula too great and complete reliance is placed on S for determination of the eventual static resistance of the pile and in a purely static analysis the absence of the important clue S is a great handicap. The formula given takes all important clues into account. The considerable effect of the B factor is evident if one reflects on the great range of difference in its value on these 170 tests—from 0.25 to 1.45. Without the B factor this formula bears a considerable resemblance to the Hiley formula (described in "Pile Driving Handbook" by Robert D. Chellis), although it was conceived as a result of an entirely independent and quite different procedure.

The values of M in the B-45 are greater than the corresponding values in the previously published B-41. The change was made to correct an internal discrepancy in the formula. It has only a very slight effect on R because the values of B_S, B_L and B_C have been reduced in a proportion that causes the reduced evaluation of B to approximately balance the increased evaluation of M. On account of this change and others, the B-41 formula should no longer be used. The empirical methods of determining the value of C_1 and of C_2 take into account in an approximate manner the principal, pertinent influences affecting these terms. C_3 is assumed as 0.04 in. for all cases because the author lacks a good rule for determining a more rational variable value. The resultant C, although imperfect, has been found very satisfactory. A constant C as used in the B-41 is appropriate only for an average range of conditions which is often difficult to recognize. On the 170 test cases, the B-45's C varied from 0.08 in. to 0.72 in. On only two of these test cases were field measurements of rebound after the blow available for comparison with $C_2 + C_3$, and according to these, the B-45 method for determining C appears to result in a slightly too great value of C.

Test-loaded test piles, of course, provided an indispensable basis for the development of these formulas. Nevertheless, test-loading on a construction project is generally less desirable than a dependable capacity formula, for the following reasons: (1) Test loading is somewhat expensive; (2) It causes objectionable delay; (3) It does not directly tell the engineer how deep a pile should be driven but merely indicates whether an already-driven pile's penetration is just right, too great or not deep enough and does not directly provide an accurate clue to a different penetration that would be correct.

Credits

No commercial concern is in any manner responsible for anything contained in these formulas. The formulas are entirely the writer's idea.

Acknowledgment is made of helpful criticism received from engineers in Ohio and elsewhere. Particular acknowledgment is made of extensive criticism offered by J. R. Burkey, consulting engineer, Union Metal Mfg. Co., Canton, Ohio; Robert D. Chellis, author of "Pile-driving Handbook," Boston, Mass.; and A. E. Cummings, research engineer, Raymond Concrete Pile Co., New York, N. Y. The writer is chiefly indebted to his employer, the Ohio Department of Highways.

Siphon Culvert of Oswego Lock Gives Long Service

David A. Watt
Formerly Supervising Engineer of River Design and Construction, New York State Barge Canal System.

***Contents in Brief**—The siphon filling and emptying culverts at the Oswego lock, New York State Barge Canal, have a trouble-free service record of 36 years. Design principle and operating procedure explained. Simplicity and absence of culvert valves and operating mechanism suggest general adoption for locks of lifts up to limit of vacuum pull. Field of application expanded by the use of vacuum pumps.*

In the standard lock culvert the water in filling or emptying the chamber flows always downward. In the siphon culvert the upper and lower ends are bent up into a siphon neck, with the lip a little above the highest water level. The flow is started by exhausting the air in the neck, but it can always be controlled or stopped by admitting air through a valve in the neck. There are thus no culvert valves with their operating machinery as in the standard lock, and the only moving parts are two small gate valves at each siphon to control the air and two larger gate valves in each wall to control the vacuum tank, if two tanks are used instead of one.

The only lock in which this type of culvert is used, except for those in Germany, is, so far as the writer knows, at Oswego, N. Y., where the lock provides the outlet into Lake Ontario of the Oswego section of the New York State Barge Canal system. It was designed by the writer and based on an examination by him in 1905 of a siphon lock on the Elbe-Trave Canal in Germany. This was one of a total of seven locks of the same type then in operation on this canal, the designs having been prepared by Herr Hotopp, an eminent German engineer. The maximum lift in the series is 18 ft. Similar locks have been built in that country on the Teltow and Oder-Spree canals.

The Oswego lock was first operated in June, 1910, in the presence of a small but disappointed crowd of residents of the surrounding district, who, having watched the construction and knowing that water would never run uphill, had dubbed it "Watt's Folly." It is Lock 8 of the Oswego Canal, a detailed description was published in *Engineering News* of Nov. 17, 1910. Lock 7 is a short distance upstream, and the interval is shut off from the river by a concrete wall, thus giving a practically constant upper pool for Lock 8. The lift is about 11 ft., varying with the level of the lake. There is nothing special about the construction of the siphons, the exposed portions of which are of reinforced concrete; the chief point of interest is the vacuum tanks which provide the operating power. One of them is placed near the upper end of each wall, and operates the two siphons in that wall. They are built as a part of the masonry, and connected with the upper and lower pools by pipes with gate valves.

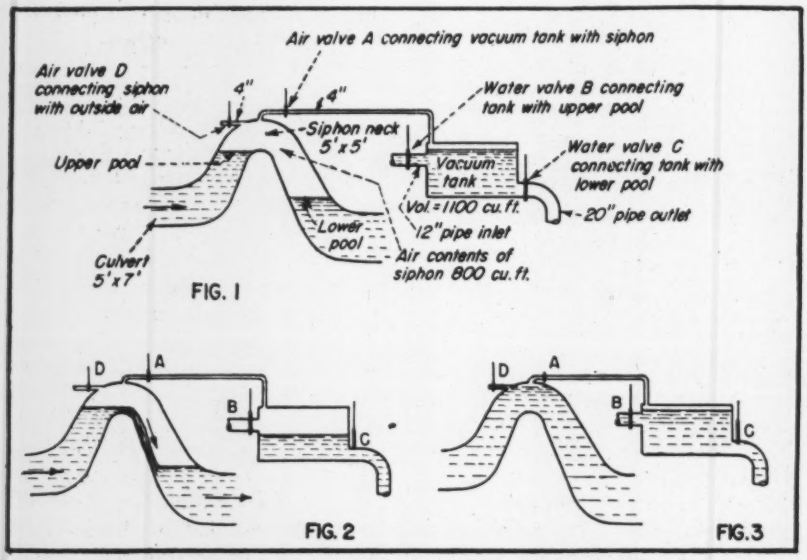


Fig. 1-3. Schematic illustration of the operation of the siphon culvert for canal or river locks having lifts within the range of vacuum pull.

Method of operation

To operate the lock, the lower-pool valve is closed, and the upper-pool valve and the air valves on the siphon neck are opened. The upper pool then fills the tank and forces out its contained air. The three open valves are then closed and the lower-pool valve is opened, suspending the water in the tank and providing the operating power. When the tank is connected with the siphon the air in the latter is pulled into the tank, causing the water to rise up to and over the si-

phon lip, and to flow down over the other side. As soon as the siphon is running about one-third full, the water begins to entrain the remaining air and to carry it out into the lock chamber, and upon reaching the crown, where the air pipe connecting with the tank is placed, it begins to pull back the water from the lower pool, refilling the tank and restoring the vacuum. The vacuum is thus self-sustaining, and only rarely, due to the slight leakage through the air valves, has it been necessary to operate the control valves of the tanks.

The operations are shown graphically by the accompanying diagrams. In Fig. 1, all culvert parts are clearly labeled. Referring to Fig. 1, the first operation is to fill or "charge" the vacuum tank with water. To do this valve *C* is closed and valves *A*, *B* and *D* are opened. Water from the upper pool then fills the tank driving out the air through the valves *A* and *D*. When no more air flows from valve *D*, the tank is fully charged. Open valve *C* and close valves *A*, *B* and *D* and the tank is ready for operation. Note the water and air conditions, Fig. 1.

To actuate the siphon, valve *A* is opened and the tank empties itself through valve *C*, sucking the air from the neck of the siphon into the tank as indicated by Fig. 2. As the air is withdrawn from the siphon the water within rises until it overflows the lip of the siphon. When the stream fills about one-third of the siphon neck it completes the priming by itself and then pulls the air back from the tank restoring the vacuum. Valve *A* then is closed.

When the lock chamber is filled (or emptied if the downstream siphons have been used) the vacuum tank and the siphon remain filled with water as indicated by Fig. 3. Valve *D* is opened and the water in the siphon subsides to pool levels, as shown in Fig. 1. The siphon is again ready to serve its function.

Service record

As will be seen, a few valves constitute the entire operating machinery. The Oswego siphons have now been in use some 36 years, and the only repairs in that period, so far as the writer has been informed, have consisted in a small amount of concrete patching eight or ten years ago.

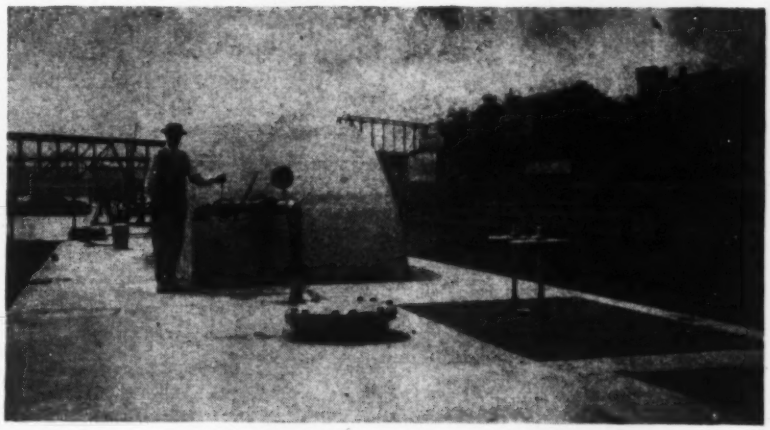


Fig. 4. Upper river wall siphon of the Oswego lock. The manhole in the foreground gives access to the vacuum tank. The valve stems on the right operate the tank valves in the recess under the grating. The lock is filled and emptied by manipulating two air-control valves at each siphon like those shown near the vacuum gage. These items comprise the entire apparatus needed for culvert control. Vacuum pumps have been added since this picture was taken.

The time of lockage, it is true, takes a few minutes longer than at the standard type locks of the canal system, but that is because the air pipes, in the absence of reliable information on the subject, were made 4 in. in diameter, and the length of the pipes retards by a few minutes the priming of the siphons. Six-inch pipes would have been better. However, due to high water in Lake Ontario in the spring of 1943, combined with freshets in the Oswego River, the operating head for the tanks became for a short time so small that they could not start the siphons, and a vacuum pump was installed. It was at once found that this gave a reliable air control at all times as well as a quicker operation, and the method proved so satisfactory that it is now used instead of the tanks.

The credit for the innovation of using a vacuum pump for control of the air is due to the operating personnel of the Division of Canals and Waterways, Department of Public Works, State of New York.

Wide field of use

This chance difficulty and its successful solution have opened up a wide new field for the siphon culvert, and have indicated that by employing vacuum pumps instead of the tanks used heretofore it can be made applicable to locks with heads varying from a foot or two in floods up to the limit of vacuum pull. This pull or lift in the opinion of former German engineers should not exceed about 26½ ft., although a few of them suggested a limit of about 20 ft. The maximum hitherto used, so far as the writer knows, is the 18-ft. lift at the Lauenberg lock on the Elbe-Trave Canal. The tank design, if the tank is to be kept of moderate size, is suited only to canals or to rivers where the flood range is slight and the lift would be moderate. Even under such conditions the tank would add appreciably to the volume of the masonry, and under abnormal conditions such as just described its vacuum might be temporarily suspended.

The vacuum pump removes these objections, and this new method, accordingly, can be applied both to canal and river locks, and will offer the many advantages, such as simplicity, economy, and reliability of operation, of the siphon culvert. For high-lift locks where the lift exceeded the vacuum limit, the method would of course be applicable only at the upper or inlet ends, but even this would solve the troubles inherent in the standard culvert valves.

To sum up the comparative features of the siphon culvert and the standard gravity culvert: the siphon culvert is entirely free from leakage, and this may be an important matter on canals and rivers in low water seasons; its construction cost should be no more than that of the standard culvert with its several wells and recesses; once built it will need prac-

tically no repairs, as evidenced by the 36-year experience at Oswego; the operating machinery will consist only of a vacuum pump for each wall (or a single one for the whole lock) and two air-control valves at each siphon; and all of the operating parts will be accessible at all times and the repair bills will be negligible.

The standard gravity culvert, on the other hand, is controlled by a large rectangular valve at each end (two valves to each lockwall in the great majority of locks) submerged except when raised and with frames and seats always under water. With the exception of the drum valve and the sliding-contact valve, which are expensive and have rarely been used in this country, all these valves are leaky and the leakage increases with age. Hardwood sealing strips soon fail to seal, and even the metal strips used on the New York State Barge Canal have been found broken by the vibration from the flowing water. This flow in time causes pitting and gouging of the concrete around the built-in valve frames, and, since these frames are always under water, they have at times been displaced before the damage was found out. In streams carrying mill waste or flowing through coal districts there is a rapid deterioration of the metal, and sand and silt are apt to cut into journals and other moving parts. Major repairs to this type of valve usually require the unwatering of the lock in which case navigation stops. The machinery for operating these valves is expensive, and on rivers of high floods often becomes "sanded up." As a final item it may be added that sunken debris sometimes wedges between the valve and the frame, preventing proper closing.

Low operating costs

The siphon-type culvert is free from all these objections. The major expense in the operation and upkeep of a lock is almost always due to the culvert-type valve and its machinery. After an experience of more than 30 years with nearly sixty locks on the New York State Canal system, whereon the Oswego lock is the only one not furnished with standard gravity culverts, the authorities report that the major repair costs and difficulties in operation have been due to the culvert valves and their machinery. This has been the universal experience on all waterways where this type of valve has been employed. The only superiorities of the standard as compared with the siphon culvert seems to be that the former can cope with lifts under which a siphon will not operate, and that it can be used to drain the upper pool, when, as on canals, this may be necessary. The siphon culvert of course can only drain the pool down to the top of the culvert. In the Oswego lock this objection was overcome by providing small slide valves at the base of the upper gates.

It may be added that the preliminary estimates for the Oswego lock showed that there would be a slight saving by adopting the siphon design. With the omission of the extra masonry required for the vacuum tanks, such saving would be appreciably increased.

Extra Beams Replace Bent In Temporary Bridge Repair

A wooden bridge on a little used dirt road in eastern Washington was repaired recently by substituting two heavy beams for a pile bent that had washed away in a flood. The road is near the site of the Potholes Dam in the Columbia Basin irrigation project (*ENR* May 16, 1946, vol. p. 780) and had to be kept open for light vehicles so Bureau of Reclamation engineers could make the surveys and soil tests necessary for the final location of the dam.

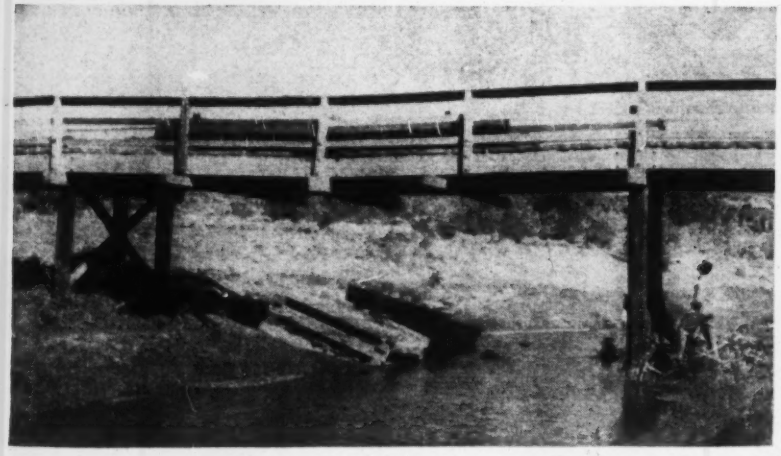


Fig. 1. Two heavy wooden beams were bolted to the deck of this bridge as a substitute for a pile bent washed out by a spring freshet in Crab Creek in eastern Washington.

A spring freshet in Crab Creek washed out a pile bent, which had been in trouble before as witness the rock-filled cribbing that had supported the piles (Fig. 1). Temporary repair methods were resorted to as it was expected that the contractor for the Potholes Dam would provide a more substantial stream crossing for his heavy construction equipment.

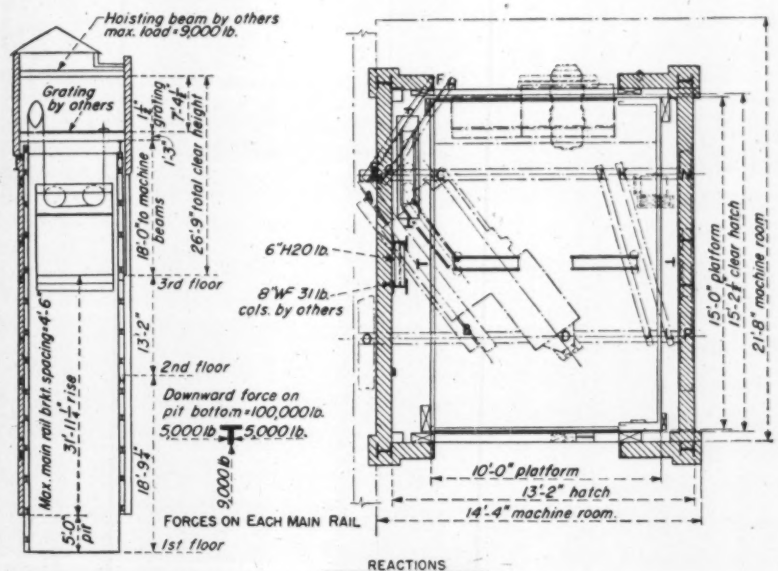
Instead of replacing the pile bent, a beam some 12 in. by 24 in. by 24 ft. was bolted with three $\frac{7}{8}$-in. bolts to each side of the bridge deck spanning the location of the missing support. The result was a much longer span over the stream than the bridge stringers were designed for. However, the newly installed beams provide increased moment resistance in the longer span. The deck now has a slight sag in it, but is able to sustain light vehicles such as are used by survey parties.

The work was done by Bureau of Reclamation forces and made use of available secondhand material.

Planning for Elevator Installations

***Contents in Brief**—Determining the number of elevators required for different types of buildings involves consideration of a variety of factors, such as number of passengers, type of freight and use of combinations of local, express and freight elevators. In each class of service, elevator groups should be arranged for efficiency of use and economy of space. While the operating equipment is generally supplied and installed by the manufacturer, the necessary supports, including those for horizontal forces, are the responsibility of the owner's architect or engineer.*

DURING the initial stages of planning multi-story structures, designers require information concerning the number of elevators, their capacity, speed, location, arrangement and support requirements. These data should be obtained from elevator manufacturers, but a knowledge of the factors upon which they depend is necessary if the architect or engineer is to evaluate the information furnished.



Impact on car buffers = 114,000 lb.
Impact on cwt. buffers = 97,000 lb.
These impacts do not occur at the same time as those on rails.

REACTIONS

A = 19,100	B = 11,300
C = 19,400	D = 7,800
E = 5200	F = 4750
G = 5450	H = 4500
I = 6,400	J = 8,500
K = 7200	L = 7,700
M = 31,250	N = 13,200
O = 12,300	P = 22,900

Supports for elevator beams at "A" to "L" incl. to be furnished by others

Fig. 1. Typical manufacturer's drawing giving hoistway and support requirements, with some dimensions and notes omitted for simplification, is shown for a 15,000-lb. capacity elevator, rated at 65 f.p.m. Note horizontal forces acting on guide rails due to braking and eccentric loading on cars. Allowance is made for 100 percent impact. As noted, the manufacturer does not furnish supports.

Elevators and related equipment, such as machinery, signal systems, cables and guide rails, are generally supplied and installed by the manufacturer. However, the owner's architect or engineer is responsible for the design and construction of components needed for supporting the plant, including buffer supports, machine-room floors, trolley beams and guide-rail bracket supports. The magnitudes of the loads are generally supplied by the manufacturer with a 100 percent allowance for impact (Fig. 1).

For the design of the supports, an allowable steel unit stress of 12,000 psi. and a ratio less than 10 for span to depth of beams are recommended. Hoistway dimensions must be within 1 in. of plumb with respect to the dimensions given on the manufacturer's drawings.

Roping affects load on structure

For a given weight of car and load, the method of roping-up the elevator has a considerable effect on the loading of the cables, machine bearings and building members. At present, practically all electric machines being installed are of the traction type, and may be divided into two general classes, double wrap and single wrap. In the first class, to obtain sufficient traction between the wire ropes and the driving sheave, which has U-shaped or round-seat grooves, a secondary or idler sheave is used. (Fig. 2A).

In the single-wrap type, the cables pass over the traction or driving sheave but once, so that there is only a single wrap, or less, of the ropes on the sheave (Fig. 2D). The traction sheave has wedge-shaped or undercut grooves that grip the cables by virtue of the wedging action between the sides of the grooves and the ropes. With this type of installa-

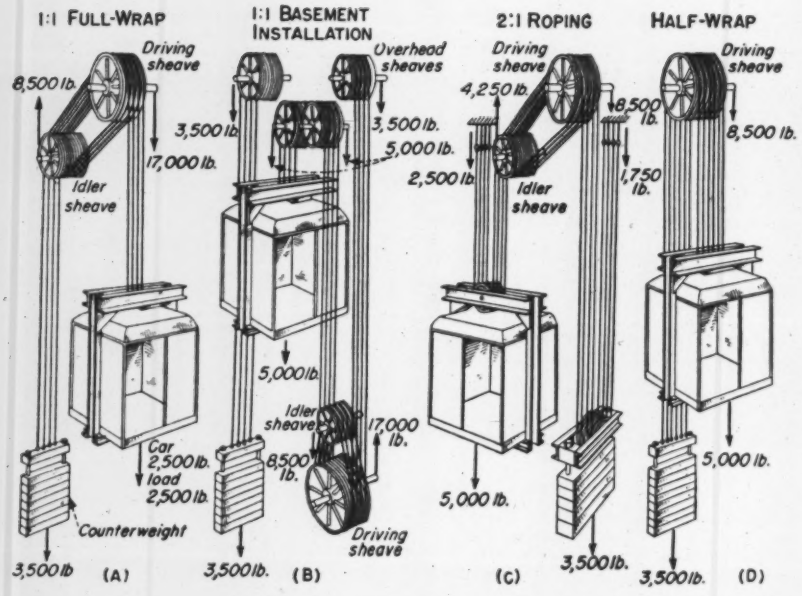


Fig. 2. Different methods of roping-up traction elevator machines and approximate loads for comparing the effect of roping on supports.

tion the sheave has one-half the loading obtained with the double-wrap machine for the same weight of car and counterweight, and consequently the single-wrap design is somewhat lighter. Also, cable life is generally a little longer because there are fewer bends in the ropes.

In most cases, elevator machines are located overhead. When it becomes necessary to install a machine in the basement (Fig. 2B), the load on the overhead supports is increased, about three times the amount of cable is required and the additional sheaves make the cost considerably more. Due to the increased friction losses and the number of rope bends, the available traction between the cables and the driving sheaves has to be higher than with overhead machines for the same conditions of load and speed. Furthermore, cable life may be shorter, power consumption higher and, consequently, operating expenses greater. For these reasons, the basement-type installation should be avoided whenever possible.

When heavy loads are to be handled and speed can be sacrificed, a 2-to-1 roping is often used (Fig. 2C), in which case the car speed is only one-half that of the rope. Instead of the ends of the cables being attached to the car and counterweight, as for the 1-to-1 roping, they are dead-ended to the overhead beams. Since one-half the weight of the car and the counterweight is carried on the dead ends, the loading on the traction and secondary sheaves is only about one-half that for the 1-to-1 machine, and consequently a lighter machine can be used.

In addition to providing supports for vertical loads, designers must also make provision for resisting horizontal forces. Guide rails must be braced not only to reduce their l/r but to withstand the side thrust due to eccentric loads on the car. Side thrust may be quite large if the car is brought to a quick stop by the safety brakes gripping the rails. In one case, an unbraced wall to which guide rails were fastened cracked under the expanding action of the rails when the "safeties" were applied.

Estimating required elevators

The number of passenger elevators needed to serve a building adequately depends upon their capacity, the volume of traffic and the interval between cars. In the case of existing buildings, traffic flow is obtained by actual count, plotted for 5-min. intervals and analyzed for maximum conditions. For a proposed office building the peak traffic in a 5-min. period is estimated by comparison with existing buildings of the same class and occupancy located in the same or a similar neighborhood. The traffic requirements of hotels, hospitals, courthouses, department stores or other such buildings are generally similar even in different cities.

For a proposed diversified-tenancy, or general-purpose, office building, the peak traffic may be estimated in terms of the probable population, which in turn is figured from the net rentable area—the floor area between walls, excluding the space needed for elevator shafts, corridors, stairways, toilets, columns and piping. When floor plans have not been sufficiently developed, the net rentable area is generally estimated at from 65 to 70 percent of the gross area.

The density of population—net rentable area per person—for a general-purpose office building varies from 90 to 135 sq. ft. per person and for a proposed structure may be assumed as 100 sq. ft. per person. However, when several floors are occupied by a single organization with a large clerical staff, the density may be much higher and these areas should be given special consideration.

General-purpose building traffic

Usually, diversified-tenancy office buildings have important traffic peaks in the morning, at noon, and in the evening, and very little interfloor traffic. Unless extraordinary conditions exist, the 5-min. morning peak is considered the controlling factor, because if the elevators can handle that peak satisfactorily, they can also deal with the others. In a well-diversified office building, the 5-min. peak usually does not exceed one-ninth of the population. When the tenancy is not so well diversified, one-eighth is a more accurate estimate.

The maximum amount of traffic is usually transported when the passenger load is less than the capacity rating because the number of stops is reduced and passengers have room to enter and leave the car without undue lost time. For example, the maximum allowable capacity of a 2,500-lb. elevator is 16 persons, including the operator, but the maximum elevator handling capacity is taken as 12 in calculations. The 5-min. handling capacity per elevator is found by dividing 300 sec. by the round-trip time in seconds and multiplying by the number of passengers to be transported per up-trip.

The round-trip time of an elevator

is the interval between up-trips commencing from the ground floor. It includes time for the passengers to enter and leave the elevator at the first floor, for the elevator to travel to the upper terminal and return, for passenger transfer at intermediate floors on both the up and down trips, for operating car and hoistway doors, and for limit slow-down. To this total 10 percent is usually added to allow for scheduling and other contingencies.

When round-trip time is computed for the morning and noon peaks, the elevator is considered loaded to its maximum handling capacity, rather than to its capacity rating. On the other hand, during evening peaks, the elevator is assumed loaded to capacity because all traffic is directed to the first floor.

In recapitulation, the maximum 5-min. traffic flow is counted or estimated from the population of the building, which in turn is computed from the net rentable area, and the 5-min. handling capacity of an elevator is determined from the round-trip time. Then dividing the estimated maximum 5-min. traffic flow by the 5-min. handling capacity gives the minimum number of elevators required.

Good service depends on "interval"

Besides handling capacity, there is another factor to be considered in determining the number of elevators for adequate service—"interval"—the average time between elevators leaving the ground floor. As an indication of the length of time passengers must wait for an elevator, it is a significant measure of good service.

After the number of elevators is computed on the basis of traffic flow and handling capacity, the interval should be checked. Usually figured for the morning peak, it is obtained by dividing the round-trip time by the number of elevators.

For busy, high class office buildings in large cities, intervals generally may be classified as follows: 20 sec., excellent; between 20 and 25 sec., good; between 25 and 30 sec., fair; between 30 and 35 sec., poor; and over 35 sec., generally unsatisfactory. In small cities, intervals of 30 sec. and longer may be satisfactory for diversified tenancy office buildings.

When elevators are divided into local and express service, it is desirable to equalize the intervals, but this is often impossible because the necessary number of express elevators would not be economically justified. Intervals for high-use elevators may be as high as 30 to 35 sec. and still be considered satisfactory.

To illustrate how the various factors are used, the number of elevators required for a 12-story diversified-tenancy office building with a net rentable area of 122,000 sq. ft. will be computed. The elevators, serving as locals with a rise of 133 ft., will be assumed rated at 2,500 lb. and 700 f.p.m. Thus, while the capacity of an elevator is 15 passengers (2,500/150 −1), only 12 will be considered to be in the car on the up-trip, and the elevator will return with the operator only.

With a given number of possible stops and persons in the car, there are a certain number of probable stops, which are determined by the law of probability. Typical curves used to express this relationship are shown in Fig. 3. In this case, the possible stops on the up-trip are 11, and the probable stops per round trip are estimated to be 8.8. The round-trip time per elevator is computed to be 102.8 sec. Thus, the 5-min. handling capacity is 300 × 12/102.8 = 35 persons.

If the population density is estimated at 100 sq. ft. per person, the population of the building is 1,220, and the estimated maximum 5-min. traffic flow is 1,220/9 = 136 persons. Therefore, the number of elevators required is 136/35 or 4. The interval with four elevators, 102.8/4 = 25.8 sec., is satisfactory.

It might be well to emphasize here the importance of the time lost in entering and leaving elevators. Opening and closing of doors may contribute materially to this loss, unless

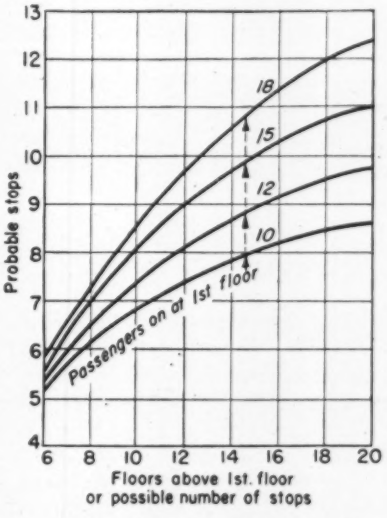


Fig. 3. For a given number of passengers and possible stops, the curves indicate the probable stops an elevator will make. (Reproduced from "Electric Elevators," by F. A. Annett, McGraw-Hill Publishing Co.)

the doors are properly designed. With a 3-ft. 6-in. opening, two passengers may conveniently enter and leave a car abreast. A slightly wider door would be of little advantage in office buildings, whereas department stores, hospitals and other structures with large passenger elevators (4,000 lb. and over) usually require much bigger openings.

Center opening doors, preferred for power operation, are faster than either the single or two-speed type of the same width. The impact on closing is smaller with the center-opening door, so that there is less chance of injuring a passenger. Also, transfer time is less since passengers can move out as the door starts to open.

Another factor affecting passenger transfer time is the shape of the car. The narrower and deeper a car the greater is likely to be the time required for passengers to exit. Platform sizes should conform to the standards of the National Elevator Manufacturing Industry. Depths front to back are for 2,500 lb., 5 ft.; for 3,000 lb., 5 ft. 6 in.; and for 3,500 lb., 6 ft. 2 in. The width in these cases is 7 ft. to provide for 3-ft. 6-in. center-opening doors.

While an efficient starter may be able to dispatch elevators to advantage, it is generally found that various influences prevent optimum scheduling. For that reason, dispatching devices are required for automatically scheduling the elevators during the various peaks. The following car speeds may be used as a guide: 4 to 10 stories, 200 to 500 f.p.m.; 10 to 15 stories, 600 to 700 f.p.m.; 15 to 20 stories, 700 to 800 f.p.m.; 20 to 50 stories, 900 to 1,200 f.p.m.; and over 50 floors, 1,200 to 1,500 f.p.m. At the present time, speeds greater than 1,500 f.p.m. are not advisable due to the discomfort caused passengers by changes in air pressure.

Elevator arrangements

Elevators should be easily accessible from all entrances to a building, and for maximum efficiency should be grouped near the center of the structure. Except possibly in the case of extremely large buildings, two banks of elevators located in different parts of the structure should not serve the same floors. Generally, traffic cannot be equalized on the two banks, and the bank near the princi-

pal exit or street will handle most of the traffic.

Elevators should not serve two lower terminal floors, for then the round-trip time is increased and the handling capacity decreased. If traffic warrants it, escalators should be installed between the two levels.

In laying out an elevator group not more than six elevators should be placed in a straight line. A good arrangement is one in which elevators are located in alcoves off the main corridor. This layout eliminates interference between elevator and other traffic, makes possible narrow corridors, saves space in the upper floors, decreases passenger transfer time, and reduces walking distances to the individual elevators. For easy access and economy of space, the elevators should be placed as close together as possible. The width of the alcove need not be more than 8 to 10 ft., except in the case of large elevators, where the width may be 14 ft.

For tall buildings, especially those with towers and setbacks and for low buildings with large rental areas, it is necessary to divide the elevator group into local and express banks (Fig. 4). No fixed rule can be set down, but in general when eight or more elevators are required, consideration should be given to such an arrangement, with one or two of the elevators of the high-use express bank provided with openings at all floors for Sunday and holiday service. This division of traffic in addition to improving elevator service has the advantage that corridor space on floors where there are no doors can be utilized for toilets, closets and stairs.

Usually separate service elevators are not required for a diversified-tenancy office building unless it is very large (500,000 sq. ft. of net rentable area or over). One of the passenger elevators can be detached from the bank and used for freight work when traffic is light.

Single-purpose buildings

Elevator requirements of types other than diversified-tenancy office buildings are computed somewhat along the same lines. However, some of the factors are considerably different. For example, single-purpose office buildings are occupied by one large organization, such as an insurance, telephone, oil, railroad, or utility company. Generally, the floors that are occupied by the clerical staff are not subdivided into many offices, and the net rentable area is about 80 percent of the gross. Depending on the kind of business that will occupy the building, the population density varies from 40 sq. ft. per person for life insurance companies to about 100 for some telephone companies, so that densities are higher than for general-purpose edifices.

While traffic peaks occur at the same periods as in the diversified-tenancy type, the morning peak is very high unless working hours are staggered. Morning peaks vary from 12.5 to 50 percent of the population in 5 min., depending on the type of occupancy. Because of this great volume of traffic, elevators should be of not less than 3,000-lb. capacity to reduce their number to a minimum. In addition, in this type of building, interfloor traffic is large and must be given consideration in designing the elevator plant. Usually so many elevators are required for handling traffic that the interval is satisfactory.

Fig. 4. Location of office-building elevator groups in alcoves off the main corridor makes for efficiency of operation and economy of space.

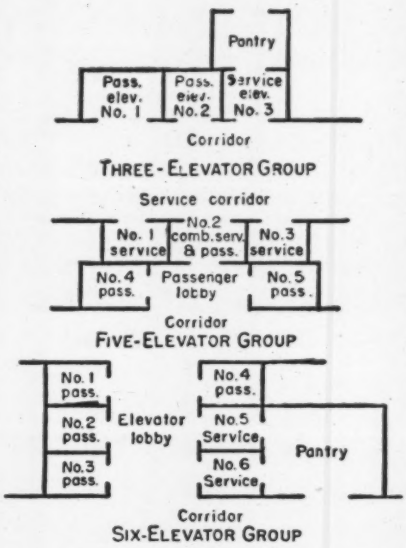


Fig. 5. Hospital elevators arranged for efficient service utilize service elevators with front and rear doors.

Professional buildings and hotels

In the case of buildings occupied by doctors, dentists and other professional men, population cannot be used as the sole basis for determining the number of elevators because of the volume of patient and visitor traffic. Varying with different locations, the peaks occur in the forenoon and mid-afternoon, with the maximum taking place when reception hours coincide. Traffic studies indicate that the maximum peak varies from 2 to 6 persons per doctor per hour up and down.

The elevators should not be of less than 3,000-lb. capacity, since crowding of incapacitated patients is inadvisable. If the building has a private hospital, then one or two of the elevators should have stretcher-size platforms, 5 ft. 8 in. by 8 ft. 4 in.

Hotels accommodating transient guests average 1.3 to 1.5 persons per sleeping room and have pronounced traffic peaks in the morning and evening. Maximum traffic flow occurs at the check-out hour in the evening and is about 10 percent of the estimated population, with the traffic in both directions.

Ballrooms and banquet rooms should be located on lower floors and served by separate elevators. Sometimes it is advisable to provide an express elevator to serve heavy roof-garden traffic. Service elevators are very important and should have a capacity of at least 3,000 lb., with platforms about 6 ft. 4 in. by 6 ft. 2 in. The number required is usually determined by comparison with existing hotels. Passenger elevators should also be of 3,000-lb. capacity to allow room for bellboys with baggage. Intervals for passenger elevators should not exceed 50 sec.

Hospital elevators

Traffic in a hospital is of two types: 1. medical staff and equipment; and 2. transient traffic, such as patients and their visitors. Visitors combined with the regular hospital traffic produce the greatest peaks because of the great volume to be handled during the short visiting hours. Waiting rooms should be

provided at the first floor and only a limited number of visitors permitted to leave at one time so that the traffic peaks may be handled in a reasonable period and the hallways will not be congested. Visitor traffic averages from 1½ to 2 persons per bed for private hospitals and from 3 to 5 persons per bed for veteran and city hospitals.

For flexibility of service, hospital elevators should be stretcher size—5 ft. 4 in. wide by 8 ft. or 8 ft. 4 in. deep, with a capacity of 3,500 or 4,000 lb., respectively. The 4,000-lb. elevator generally is preferred because of the availability of extra room for attendants to travel with the stretchers or beds. Speeds vary from 50 to 700 f.p.m., depending on the height of the building and the load. Since patients should not be bumped on and off the elevators, self-leveling is a primary requisite.

Elevators should be centrally located and readily accessible from the main entrance. Service elevators can be arranged with front and rear doors and so located that they can assist the passenger elevators during traffic peaks (Fig. 5). While intervals are not of much importance in hospitals, they should be taken into consideration.

Other types of buildings

Apartment houses do not have as pronounced traffic peaks as other buildings. Generally, the evening peak is the highest and may be estimated at 6 to 8 percent of the building population, which in turn can be computed on the basis of about 2.6 persons per apartment.

Usually one elevator rated at 2,000 lb. and 200 f.p.m. is sufficient for a six story apartment house with 50 to 75 apartments. For buildings over six stories in height, two elevators operating at speeds of 400 to 500 f.p.m. are generally adequate. One of the elevators can be used for service work at times.

Municipal buildings, city halls and state office buildings are treated the same as single-purpose office buildings. For large government office buildings in Washington, D. C., a density of one person per 100 sq. ft. of net rentable area and a 5-min. morning peak of one-third the population are specified.

Considerably different traffic flow problems are encountered in department stores which should preferably be served by a coördinated system of escalators and elevators. The required capacity of the vertical transportation system is based upon the transportation, or merchandising, area and the maximum density to which it is expected to be occupied by shoppers. The transportation area is all the floor space above or below the first floor to which shoppers and employees must be carried. Usually about 80 to 85 percent of the gross area, it includes the space occupied by counters, showcases, aisles, fitting rooms, waiting rooms, public rooms, restaurants, cafeterias, credit offices and cashiers' counters, but does not include kitchens, general offices, accounting departments, stockrooms, stairways, elevator hoistways or other areas for utilities.

The transportation capacity is the number of persons per hour that the vertical transportation system can distribute from the main floor to the other merchandising floors. Dividing the peak transportation capacity by the transportation area gives the density ratio, which is about at 1:20 for a busy department store. Thus, for an eight-story store having a transportation area of 112,000 sq. ft., with a density ratio 1:20, the required hourly handling capacity is $112{,}000/20 = 5{,}600$ persons up from the first floor by elevators or a system consisting of a combination of elevators and escalators.

The maximum peak hour generally occurs from 12 to 1 on weekdays and between 2 and 3 on Saturdays. The type of elevator preferred for use in conjunction with escalators has 3500-lb. capacity, center-opening solid-panel power-operated car and hoistway doors with a 4-ft. 6-in. opening, and a platform 8 ft. by 5 ft. 6 in.

Credit for much of the material in this article is due H. M. Nugent, Otis Elevator Co., New York 1, N. Y.

Grounded Air Hose Protects Drillers From Punctured Electric Conduits

By providing electric grounding with a resistance only a fraction of one percent of that of the human body, a safety air hose for use where unknown electrical conduits might be penetrated has been developed by Lee Doyle, engineer for Darin & Armstrong, a large Detroit contracting firm.

Over the usual rubber and cord of the high-pressure air hose, a spiral of 832 braided strands of No. 30 bare copper wire provides the safety feature and are covered with neoprene synthetic rubber. When properly connected through the couplings and grounded, the hose has a resistance of less than 0.06 ohms, compared with 200 to 1,000 ohms for the human body. Following the path of least resistance, any current struck by the tool penetrating unknown wires in excavations around plants and on utility systems is shorted to the hose rather than carried into the driller's body, even though he may be standing on wet ground or on a highly conductive surface.

Safety hose must be continuous from the tool back to an adequate ground. Where the drill is operated from a plant's air-supply piping system, it will ordinarily be well grounded. When used with portable compressors, especially those on pneumatic tires, a separate ground is required. A No. 4 ground wire from close to the hose connection on the compressor and clamped to a water pipe, sprinkler system, or the steel frame of a building or to a heavy pipe driven into the earth will be adequate. However, paint and rust at point of contact must be removed for a good connection and the ground should be frequently checked to see that vibrations of the compressor or tool has not loosened it.

Use of such safety hose is expected to alleviate serious accidents or death to drill operators from a factor that now causes more than 500 deaths annually. But, the contractors warn, vigilance in locating and avoiding underground conduits should not be relaxed. Drilling into charged lines still will short them. Such damage may result in considerable lost time for workmen and in very high property damage from stopping work.

Fig. 1. In the vicinity of Mt. Mitchell, 28 mi. are being surfaced with cold-laid asphalt put down on an 8-in. stone base.

Work Resumed on Blue Ridge Parkway

***Contents in Brief**—Operations typical of the grading and paving methods to be followed to complete the 477-mile Blue Ridge Parkway are now underway. Inaccessibility of area traversed dictated that the grading contractor build a trail road for length of his project. As part of grading work he must construct the 8-in. stone base for the finished pavement, the base being placed on from 18 to 24 in. of porous material of the A-1, A-2, or A-3 classification. A decade of work reveals that the most satisfactory pavement is 250 lb. per sq. yd. of asphaltic concrete manufactured with limestone aggregate and put down in two courses as a cold-laid mix. The paving has been completed for 171 miles, but the entire parkway may not be finished until 1952.*

RECENTLY two contracts totaling nearly $900,000 were signed by the Secretary of the Interior to resume construction of the Blue Ridge Parkway. Award of two other contracts to cost $700,000 has been deferred tentatively because of the "moratorium" order on federal construction issued Aug. 6 by the Office of War Mobilization and Reconversion.

Totaling 477 miles in length, the parkway extends from the southern end of the Skyline Drive in Shenandoah National Park in Virginia to the Great Smoky Mountains National Park on the Tennessee-North Carolina border. The scenic route follows the crest of the Blue Ridge Mountains, from which the parkway gets its name. It has an average elevation of over 3,000 ft., getting as high as 5,700 ft. near Mt. Mitchell in North Carolina.

Work was begun in 1935, and prior to this fiscal year about $22,500,000 had been spent on construction. The paving has been completed for 171 miles, 28 miles are being paved, 117 miles is graded with the stone base in place ready for the finished paving, another 6 miles have been graded but no base put down, and grading is underway on 16 additional miles. The remaining 139 miles is located and planned sufficiently that all remaining construction could get underway in a short time if the money were available and this were considered desirable.

The states of Virginia and North Carolina are providing the necessary land for the parkway. Construction is being financed entirely by the federal government with the Public Roads Administration handling surveys, planning and construction in collaboration with the National Park Service, which provides the landscape and architectural supervision.

Standards are high

In planning the parkway it was assumed that it would be used primarily by passenger cars and that only a limited number of busses and no trucks would be allowed on the road. The standards developed to meet the needs of this type of traffic are considered high for the rugged terrain traversed. The paved roadway width has been set at 20 ft. plus widening on curves, the maximum grade at 8 percent for a distance of not over one-quarter mile, and the

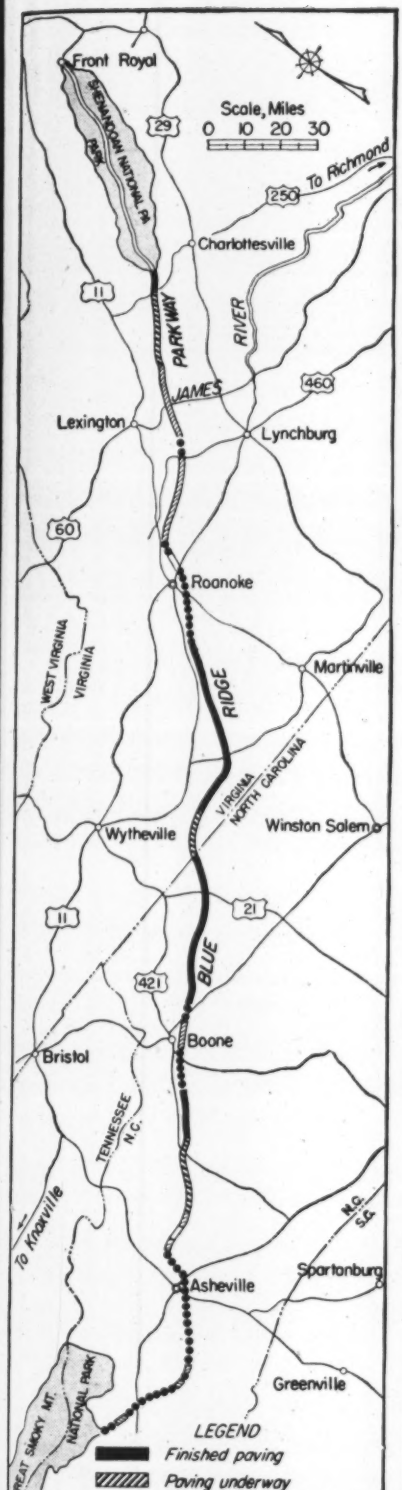


Fig. 2. The parkway connects Shenandoah and Great Smoky Mountains national parks and is 477 mi. long. In all, 171 miles have been paved.

minimum radius of curvature at 150 ft. for inside curves and 200 ft. for outside curves. A crown of 2 in. is used on tangents and gradual curves, and on curves sharper than 1½ deg. a maximum superelevation of 0.10 ft. per ft. of roadway is permitted. A minimum shoulder width of 5 ft. is specified for each side; wider shoulders were preferred but the extensive rock encountered makes such a plan too costly. The average width of the right-of-way is about 600 ft.

Construction to these standards is resulting in a highway that would permit safe speeds up to 60 mph. for long stretches, but to make the maximum permissible speed in substantial conformity with that allowed on the highways in the states traversed, the top speed has been set at 45 mph. Where the alignment does not permit this rate of travel, the maximum safe speed has been indicated with signs.

Grading goes forward

Construction now underway includes a 5.1-mi. grading project by W. E. Graham & Sons, Cleveland, N. C., north of Roanoke. This work, which is being done under a $444,000 contract, is considered typical of the grading procedure expected to be used on the remaining gaps of the parkway.

As a first operation the right-of-way was cleared. Next a trail road was put through to provide access for the full length of the project. Now, simultaneously with construction of the numerous culverts, most of which are built of reinforced concrete pipe, the grading work is being advanced at a number of points. The contractor is required to place all fills, unless the material is primarily large stone, in 8-in. layers and to compact the material with sheepsfoot rollers.

The grading contractor is also required to put down the 8-in. thick stone base for the basement. Several types of base have been used to date, including traffic-bound crushed stone, crushed stone stabilized with soil, and crushed stone and soil stabilized with a bitumen. In some cases in the past, a base only 6 in. thick was used and the decision as to whether or not the existing foundation soil immediately below the base should be replaced was left up to the engineer in charge.

As work advanced and more was learned about the soils encountered and the success of different types of bases, it was concluded that a base at least 8 in. thick was desirable. The plans now being followed also require that where the existing soil is not granular material of the A-1, A-2, or A-3 groups as classified by PRA standards, the excavation should be sufficient to allow for the addition of at least 18 in. of a material of one of these types below the base.

It is also specified that on fills made with non-porous materials a topping of one of these soils should be used on the fill below the base, a topping of 18 to 24 in. thick being desirable. Originally, the subgrade through rock cuts was brought up to grade by addition of a fill of the best soil available locally, which frequently contained considerable clay. But experience showed that a porous material was needed between the rock and base stone, and the present procedure is to even up the rough rock subgrade with a "sledged" stone material composed of rock fragments or crushed stone. Upon this fill is placed the regular 8-in. thick stone base.

The 8-in. base course is being added in three equal layers and the material is compacted with steel-wheel smooth rollers and hauling equipment. Material considered satisfactory for the base, including the filler, must have the following gradation:

Sieve Size	Percent Passing
2-in.	100
1½-in.	70 to 100
1-in.	55 to 85
¾-in.	50 to 80
⅜-in.	40 to 70
No. 4	30 to 60
No. 10	20 to 50
No. 40	10 to 30
No. 200	5 to 15

It is further required that the portion of the filler passing the No. 40 sieve shall have a liquid limit of not more than 25 and a plasticity index of not over 6. In addition, the coarse aggregate must have a percent of wear of not over 50 by the Los Angeles test.

Once the base for a section of the parkway has been completed, the general practice is to open that portion of the road to traffic. If the project is completed during the dry season, an application of 1½ lb. per sq. yd. of calcium chloride is applied to keep down the dust, later applications being applied as needed.

The paving is done under a sepa-

Fig. 3. Grading work underway includes 5.1-mi. project near Roanoke. Because of inaccessibility of area, construction of trail road followed closely behind clearing work.

Fig. 4. In steep mountainous terrain numerous retaining walls of stone-masonry are required. This wall is several hundred feet long.

rate contract not let until at least a year after the grading and base course are completed. This procedure permits the fills to settle and reveals weak spots in the base. The paving work is let in contracts for sections varying from 15 to 30 miles in length.

One 28-mi. paving contract estimated to cost $424,000 is now underway by the J. R. Ford Co., Lynchburg, Va. This project is located between Boone, N. C., and Asheville, N. C. The work is considered typical of the paving methods developed during the past decade as most satisfactory for the type of finished roadway desired.

On the early projects, the paving procedure consisted of a simple surface treatment followed in a few years by a bituminous top put down by road-mix methods, other treatment being impossible because of the limited funds available for the early sections. But as construction advanced it was found more economical to eliminate the bituminous surface treatment and instead, after traffic had traveled over the base at least a year, to apply a plant-mix asphaltic concrete. Although both the road-mix and plant-mix pavements had the rough-textured surface desired, the plant-mix resulted in a tighter pavement and from the standpoint of maintenance costs and other factors was considered more economical over a period of years.

Cold-laid concrete best

Construction operations at the high altitude of much of the work and the resulting cool temperatures, plus the long haul distances from the batching plant to be encountered, also revealed that it was best to use a cold-laid bituminous concrete. As a result of all these factors, the present paving program calls for 250 lb. per sq. yd. of asphaltic concrete prepared to the type H-1 standards of the PRA. Of this total, 160 to 170 lb. is used as a first course and 90 to 80 lb. as the wearing course with the thickness of the first about 0.7 of the total, which is approximately 2¼ in.

Both the bottom and top courses are prepared with limestone aggregate. Previous experience using local stone with bituminous material in road-mix and surface-treatment work, showed that the large mica content in other local aggregate prevented a complete bond with the bitumen. Therefore, for all plant-mix work, limestone aggregate has been specified.

Stone termed satisfactory for the first course of the pavement must meet the following gradation:

Sieve Size	Percent Passing
1½-in.	100
1¼-in.	95 to 100
½-in.	10 to 35
No. 4	4 to 16

To the above stone 3.5 to 6.0 percent of 85 to 100 penetration asphalt is added, as are 0.4 to 1.0 percent of hydrated lime and 0.2 to 1.2 percent of petroleum naphtha liquefier.

Gradation of the limestone considered suitable for the wearing course is as follows:

Sieve Size	Percent Passing
¾-in.	100
½-in.	95 to 100
No. 4	15 to 40
No. 8	10 to 25
No. 20	5 to 15
No. 50	0 to 5

For this course 4.5 to 7.0 percent of 85 to 100 penetration asphalt is used. The percent of lime has been set at from 0.5 to 1.0 and that of the liquefier from 0.2 to 1.5. Experience in using the above mixes on the parkway indicates that the best results are obtained if the percent of bitumen equals or is slightly less than the average of the limits listed.

The mixing plant of the Ford Com-

pany was set up at the nearest available railroad siding, which was about one mile from the north end of the project, resulting in a maximum truck haul of nearly 30 miles. A pug mill with a capacity of 60 tons per hour is being used. To provide for storage of materials the contractor has blocked up adjacent to the railroad siding five 10,000-gal. company-owned tank cars, two of these being used for asphalt storage, two for liquefier and one for the grade of diesel oil used to heat the aggregate. A coal-fired boiler of 50-hp.-per hour capacity is used to supply steam for the pumps, to heat the stored asphalt, for operating the bin gates and to supply the steam added to the fuel oil for the drum flame of the pug mill.

A mixing time of 2½ min. is used, the stone being added to the pug mill at a temperature of 110 deg. F. and the asphalt at 275 deg. F. The asphaltic concrete, which is prepared in 2½-ton batches, leaves the plant at a temperature of 120 to 125 deg. F. It is delivered to the desired site in trucks hauling no more than two batches, as the maximum vehicle load permitted on the base is 17,000 lb.

Previous to construction of the binder courses the base is compacted with 10-ton smooth-wheel rollers and a prime coat of from 0.35 to 0.40 gal. per sq. yd. of RC-2 or RC-3 asphalt is applied at a temperature of 125 to 150 deg. F. Construction of the wearing course follows a day or two behind the binder.

Forms for the pavement are seldom used, except on sharp curves. Steel-wheel rollers of 10-ton capacity are employed to compact the bituminous concrete. Severe smoothness tolerances have been set up for both courses. Parallel to the center line the base course must not vary more than ¼ in. in 10 ft. and top not over ½ in.

As a final operation the top course is given an application of 3 to 4 lb. per sq. yd. of mineral dressing. Material considered suitable for this work must meet the following gradation:

Sieve Size	Percent Passing
No. 4	100
No. 8	95 to 100
No. 50	20 to 50
No. 200	0 to 3

Generally, limestone dust is used for the dressing, but clean sand or stone screenings may be substituted. In

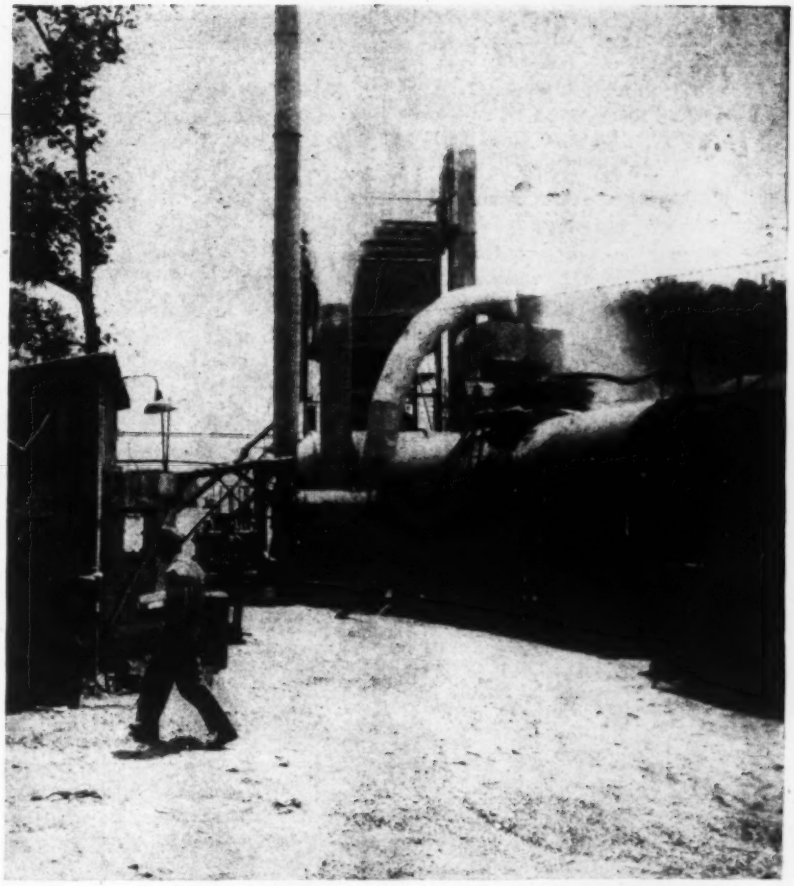


Fig. 5. The contractor for the 28-mi. paving job had to set up his mixing plant near one end of the project, a plant with a capacity of 60 tons per hour being selected. Five 10,000-gal. railroad cars assembled on blocking provide storage for asphalt and other supplies.

Fig. 6. Grade separation structures are planned to carry parkway over or under all existing highways. Most of these bridges will be stone-faced rigid frame structures or arches, such as this bridge carrying the parkway over U. S. Route 21.

applying the cover from 1 to 4 percent of RC-2 or RC-3 asphalt is added, as are 0.2 to 1.5 percent of liquefier, and from 0.1 to 0.5 percent of hydrated lime. The cover material is spread from the tailgate of a truck and is distributed and worked into the surface voids by a broom drag pulled behind the truck.

Two other paving contracts are under way. These are one covering 27.3 miles of asphalt in Nelson and Augusta counties in Virginia, held by the Virginia Asphalt Paving Co. and totaling $356,238; and another of $358,515, held by the American Asphalt Products Co., covering 17.5 miles in Carroll and Grayson counties in Virginia.

In addition to the contracts previously mentioned, the Southern Explosives Co., Charlotte, N. C., has started an $18,000 contract for about 2,600 ft. of exploratory core drill for nine tunnels considered necessary on a section southwest of Ashville. One tunnel may be 1,400 ft. long. A total of eleven tunnels have already been built on the parkway.

Much work remains

When the work now underway is completed, much construction will remain to complete the several long gaps now located and planned only. Work tentatively scheduled for award after April 1, 1947, includes completion of two grading jobs shut down during the war and totaling 11 miles, 16 miles of new grading, construction of a plant-mix top course on 61 miles, erection of the superstructure for a 400-ft. steel viaduct, and construction of four grade separation structures. However, the entire parkway is not expected to be opened to traffic until 1952 or 1953.

H. J. Spelman is division engineer in charge of eastern parks and forest roads for the Public Roads Administration. E. G. Middleton with offices at Roanoke is supervising construction of the northern 400 miles of the parkway and F. W. Cron, with offices at Gatlinburg, Tenn., the remainder. The National Park Service is charged with the administration of the parkway. For this agency Sam P. Weems is superintendent and Stanley W. Abbott resident landscape architect.

Horizontal Joint Put in Arch Dam In Effort to Prevent Cracking

George E. Goodall
Consulting Engineer, Sacramento, Calif.

***Contents in Brief**—In an endeavor to prevent cracks in a concrete arch a sliding joint was built into the structure above a horizontal foundation surface in the left abutment area. This dam has a downstream overhang of about 32½ ft. at the crown of the arch.*

LAKE LOVELAND DAM, on the Sweetwater River near San Diego, Calif., is a constant angle concrete arch about 210 ft. high from foundation to spillway crest. At the crown of the arch the dam has a pronounced overhang in the downstream direction. The most notable feature, however, is the endeavor to prevent cracks by providing a horizontal sliding joint in the concrete above a shelf in the left abutment. Conditions that led to this unusual feature are described in the following.

The dam, owned by the California Water & Telephone Co., was built to provide an additional water supply for National City and Chula Vista, necessitated by the tremendous increase in water use resulting from the location of war industries in the area served. It was because of this circumstance that construction of the dam was sanctioned during the war.

The site is in a gorge cut in granite rock classified by the geologist as quartz monzonite. This rock, though dense and hard, is intersected by numerous joints and fractures. A noticeable feature of the surface exposures was a number of large domes with incipient exfoliated structure. During excavation of the damsite, these structural deficiencies of the rock abutments caused a large increase in the amount of excavation beyond what was originally thought to be necessary to reach acceptable rock. It was at that stage of the work that the author was engaged as consulting engineer to redesign the dam as the original design no longer fitted the excavation and the rock exposure.

A complicating factor, arising from the additional excavation plus the presence of the numerous joints and fractures, was that a nearly flat bench about 85 ft. long remained in the left abutment area at about El. 1260. At the left or abutment edge of this bench the surface of the rock as excavated changed abruptly from nearly horizontal to an almost vertical face. At the right or riverward edge of the bench the surface, after excavation, sloped down very steeply toward the river channel.

This sort of foundation condition in a number of other cases known to the author has produced cracking in the concrete arch above. Wherever such abrupt breaks occur at the riverward end of a flat area of this sort, a crack can always be expected to form at the angle of the break and to extend thence upward on a slope of about 45 deg. toward the crown of the arch. In some cases such cracks have extended all the way to the crest of the dam.

STATISTICAL DATA

Reservoir storage capacity	27,700 acre-ft.
Length of crest, arch	605 ft.
Length of crest, abutment	178 ft.
Length of crest, total	783 ft.
Thickness of arch at crest	8 ft.
Thickness of arch at base	32 ft.
Radius of arch at crest	306.7 ft.
Radius of arch at El. 1165	121.0 ft.
Elevation arch crest, center section	1355
Elevation arch crest, major portion	1358
Elevation abutment crest	1362

In searching for certain prevention of such a crack, many schemes were studied and discarded. It was finally decided to locate one of the radial contraction joints directly over the angle of the break in profile and also to construct a horizontal joint a few feet above the nearly horizontal bench. It was decided that this joint should begin at the left abutment and extend thence toward the center of the arch as far as a vertical section where calculations showed no abrupt changes in radial deflections of arch rings above and below the proposed joint plane. This location will be apparent from examination of Fig. 2, in which the horizontal joint is seen to extend from vertical joint "O" to vertical joint "M."

This limitation was decided upon after radial components of the arch deflections had been computed for the rings at Els. 1275, 1265, 1255, 1245 and 1235. The deflections were calculated on the assumption that the arches resisted the total water load with no assistance whatever from the "cantilever" action. Deflection curves thus obtained were plotted and are shown in Fig. 2 to the left of the lines representing the vertical, radial joints.

The principal requirements in constructing the horizontal joint were that it should (1) provide for as free movement as possible, (2) be permanently watertight and (3) prevent any tendency of that portion of the dam above the joint to "creep" upstream as the result of changes in deflection caused either by water load or changes in temperature. To prevent leakage, a water seal consisting of a horizontal rectangular passage was formed in the concrete lying half on either side of the plane of the joint. This passage was filled with coal-tar pitch and provided with a steam pipe to heat the pitch. There were also passages leading to the downstream face through which additional pitch could be introduced.

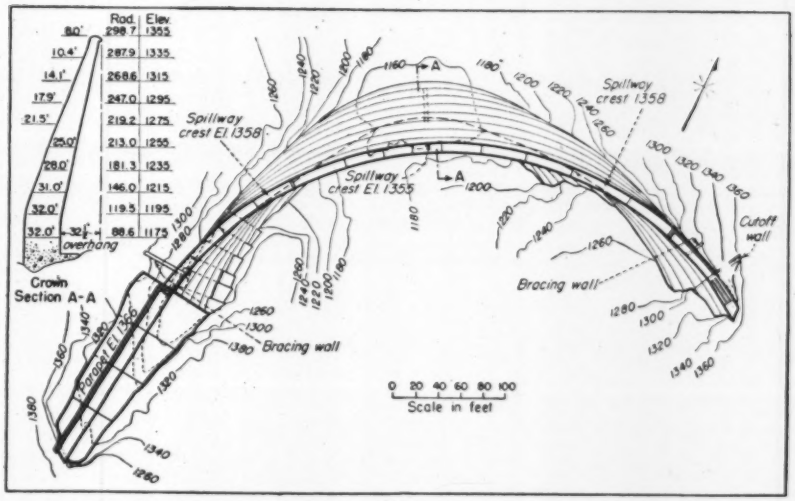


Fig. 1. Plan of the constant angle arch dam and cross-section at crown in which pronounced downstream overhang appears.

In order to facilitate freedom of radial movement of the upper part of the dam on the lower part, the top of the blocks upon which the sliding joint was constructed was smoothed to a level plane and surfaced with a wooden float. This surface was then painted with coal-tar and the painted surface covered with a $\frac{1}{8}$- to $\frac{1}{4}$-in. thickness of plastic cement consisting of a mixture of coal-tar and asbestos fiber applied cold. The plastic cement was then covered with $\frac{1}{8}$-in. thick graphite-asbestos fiber sheet. Succeeding lifts were then placed in the usual manner on the service sheet. To prevent "creep" the surface of the joint was formed with a step as shown in Fig. 3.

The dam was completed in July 1945, although water storage had been in progress since shortly after concrete placing had reached a level above the outlet works. As this was written water storage has never filled the reservoir and the horizontal joint has thus never had the ultimate test of full water load. However, there has been no indication that the usual crack will form at the break in profile.

The dam was constructed under contract by the Macco Co. under the general supervision of the California Water & Telephone Co., of which Chester H. Loveland is president; Harry Reinhardt and Peter A. Nensel are vice-presidents. Chas. P. Williams was resident engineer. U. S. Grant, University of California at Los Angeles, was consulting geologist and the author was consulting engineer from April 1944 until completion of the dam.

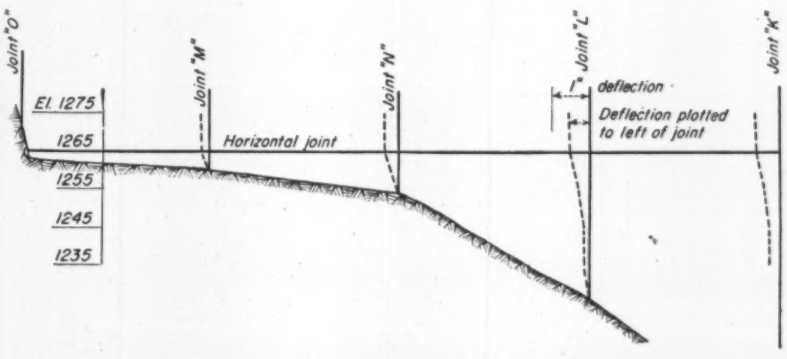


Fig. 2. The horizontal joint in the concrete was put just above the bench level, extending from radial joints "O" on abutment edge to "L" at channel edge.

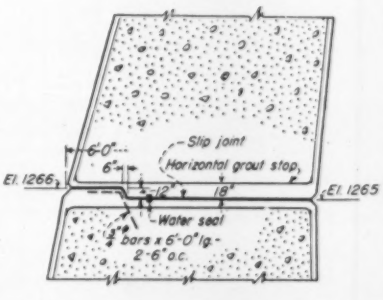


Fig. 3. Elevation of the dam section at the horizontal joint showing location of the 12-in. step and the pitch water seal.

Where We Stand on Pollution Control

***Editor's Note**—With a new session of Congress soon to convene, renewed efforts to draft legislation for stream pollution control on a national basis may be expected. Debated vigorously for years, many bills on this subject have been presented, one of which narrowly missed enactment several years ago only because of the presidential veto. The following extracts from a report on legislative accomplishments on both state and federal levels provide excellent background for the appraisal of future developments.*

SINCE NOVEMBER, 1897, almost one hundred bills pertaining to stream pollution control have been introduced in the Congress. Not one has passed. But because of the likelihood that bills on this subject will be introduced in the next session a committee on sewage disposal, in a recent report to the engineering section of the American Public Health Association, reviewed the status of stream pollution control in the United States and analyzed the types of bills proposed. Salient features of that report are included in the following.

Federal legislation for the control of stream pollution has been a hotly debated issue since 1935. Restrictions of the war years in halting the construction of remedial works, coupled with the increased discharges of waste from war industries, increased pollution problems and also increased the public's determination to do something about it.

Common law is basis

Legal and historical background in the matter points to ways and means of accomplishing the desired aim. Not only does basic riparian law limit stream flow use to reasonable quantities, but it also limits imposition on the stream's quality. In addition, many states have curtailed the riparian owner's rights of stream use by statute as a further guarantee against pollution.

Protection of the health and welfare of the people is one of the police powers reserved by the states and has been so recognized. However, the broader aspects of interstate stream regulation cease to be local problems, thus making interstate compacts or federal regulation necessary. Usually an aggrieved riparian owner has recourse to legal action in state courts. Cases between states, however, have come before the U. S. Supreme Court.

In this group are the famous cases of Missouri vs. Illinois, New York vs. New Jersey, New Jersey vs. City of New York, and Illinois vs. Indiana. The waters involved in these suits include a river, a lake and the tidal waters dividing New York and New Jersey.

State regulatory administrations

What has been done in the matter of state regulation of pollution is shown by a recent survey. Apparently, states the committee, only four states—Alabama, Missouri, South Carolina and Utah—have no specific laws prohibiting discharge of sewage or other wastes into water courses. In two others—Idaho and Nevada—the laws are very limited. Consequently, in all except four states the state government has exerted its police power and exercised the right to control stream pollution. In 28 states regulation is vested in the state board of health, although for convenience in administration 23 states have created special boards or commissions. In 27 states the conservation commission is given pollution control power for streams where fish life or shellfish are affected.

First special state body in 1923

Apparently the first state sanitary water board was created in 1923 by Pennsylvania as an administrative board within the state health department. This body has jurisdiction over state waters restricted to sewage discharge. The enabling act was amended in 1937 to provide control over industrial waste discharges and to include recreational use of state waters.

The next special state board was a committee on water pollution set up by the Wisconsin legislature in 1927. This was followed, in 1929, by special boards in Illinois, Michigan and Tennessee. Since then many others have followed this plan. Still others are preparing legislation or reports dealing with this type of regulation. In at least one case, that of Chicago, powers of the state sanitary board have been transferred to a local sanitary district within its own boundaries.

Interstate agreements

Numerous interstate compacts have been entered into on a wide range of problems. However, there are only a few relating to control of water pollution. These include: the Interstate, Sanitation Commission set up by Connecticut, New Jersey and New York to control pollution in their tidal waters; the Interstate Commission on the Potomac River Basin; the Ohio River Valley Water Sanitation District, and the Interstate Commission on the Delaware River Basin. A tri-state compact also exists between Minnesota, North Dakota and South Dakota for regulating works on the Red River of the North.

In addition, many informal agreements between officials of states have been helpful in solving interstate problems, and particularly in working toward uniform practice. Flexibility possible under such informal agreements is an advantage in cooperation prior to formulation of legislative policies.

Current activity in 35 states

Current pollution abatement activity is indicated in 35 states. In most cases sizable projects are being planned. Investigations are also in progress on the wastes of such industries as citrus-canning, petroleum, potato-starch and dairy products. Nation-wide activity by the pulp and

paper industry and the steel manufacturers' association is also being pushed.

Regarding the general aspects of governmental policy, the report points out that while the states are already exercising their police powers, the federal government may indirectly, by cooperative measures and in an advisory capacity, influence a much greater control of water pollution by the states. Additionally, the federal government has pollution-control powers necessary to fulfill its international treaty obligations, as well as over navigable waters.

Division of responsibility between federal and state control bodies may be a source of inefficiency, but it already has shown that it can and does produce results. On the other hand, enforcement by mandate, while having the appeal of being quick and effective, does not seem to be the remedy for public evils. Outcome of these circumstances is a plan of action and cooperation developed between federal and state authorities on public health matters during a period of about 50 years.

In essence the plan involves provision by the U. S. Public Health Service of research services, safe and uniform standards, guidance in methods and procedures, and financial assistance. Responsibility for legislation and administration of the program is left with state health agencies.

Notable among achievements of this working agreement in the sanitary field have been improvement of drinking water quality, decrease of intestinal diseases, successful attack on the malaria menace of the South, safe milk production and protection against infected shellfish.

Federal vs. state regulation

Attempts at federal pollution legislation in general have been of two types. The first of these provides for a central federal regulatory agency to exert control through injunction procedures in the federal courts; the second, for federal participation through an existing agency in a program of educational, research and coordinating activities with regulatory control left to the states. Both these types were represented in the bills introduced in the last Congress (*ENR* June 13, 1946, vol. p. 932).

The U. S. Public Health Service is interested in federal legislation providing for:

1. A federal agency to act as coordinator and adviser with authority to carry on research;
2. Authorization of funds for adequate administration;
3. An advisory board representing federal agencies officially concerned with uses and control of water resources liable to pollution;
4. Permission for interstate compacts on prevention and pollution of abatement;
5. Grants-in-aid for preparation of pollution abatement plans, both statewide and by cities and industry;
6. Continuing interest by the federal authority in efficient operation of completed projects.

Nevertheless, the Public Health Service has maintained an "interested by-stander" attitude, expressing no recommendations as to the nature or degree of regulatory or enforcement provisions in pollution control legislation. This, it feels, is a decision to be made by Congress. The attitude is laudable, since Congress, in order to formulate a national policy, must have a complete and unbiased understanding of the problem and in acquiring that understanding the only reliable sources of information and opinion seems to be the state agencies established to control pollution.

Cooperative committee urged

As a result of its investigation, the committee concludes that federal control over stream pollution, if exerted at all, should be restricted to interstate waters, and that enforcement should be delegated to the several state bodies. Powers to authorize loans and grants-in-aid, are best left out of any pollution control legislation.

To inaugurate positive action on its conclusions, the committee recommended appointment of a special committee to consider an appropriate water pollution control bill and to aid and cooperate with other interested societies in drafting such a bill for presentation to the next Congress, with the objects of protecting the public health and conserving wildlife and national resources, but with proper recognition and representation of the public interest.

Members of the committee are: Don E. Bloodgood, associate professor of sanitary engineering, Purdue University; Almon L. Fales, consulting engineer of Boston; C. G. Gillespie, chief of the Bureau of Sanitary Engineering, California; C. E. Keefer, engineer of sewers, Baltimore, Md.; T. J. Lafreniere, sanitary engineer for the Province of Quebec.

Also, M. L. Bosquet, Jr., of the U. S. Public Health Service, Cincinnati; F. W. Mohlman, director of laboratories, Chicago Sanitary District; Willem Rudolfs, chief of the New Jersey Agricultural Experiment Station; F. M. Veatch, consulting engineer of Kansas City, Mo.; and P. J. A. Zeller, of the Engineering Experiment Station, Texas A. & M. College.

Langdon Pearse, sanitary engineer of the Chicago Sanitary District, is chairman of the committee.

Requires 4.4 Man-Hours For Ton of Concrete Pipe

Production of one ton of concrete pipe requires an average of about 4.4 man-hours at the plant under 1946 conditions, according to a Bureau of Labor Statistics report published recently in the Monthly Labor Review.

This study, one of a series on labor requirements in the industries which supply important building materials, was made by the Division of Construction and Public Employment.

The 34 concrete pipe plants surveyed were producing at a monthly rate of 29,000 tons of pipe, each ton equivalent to an 8½-foot length of 24-inch pipe, without reinforcing. Considerable variation in labor requirements was noted between those plants which produced 1,400 tons and over per month and those producing less than 500 tons during the same period. Some variations were found to exist between plants in different geographic areas, ranging from 4.0 man-hours per ton in Pacific States to 6.2 man-hours in the Northeast.

In addition to the man-hours at the concrete pipe plants, information and estimates were obtained on labor requirements for extraction of raw materials and fuel used, hauling of these to the plant, and transportation of the finished pipe to its point of use. It was found that these operations along with manufacture required about 7.6 man-hours for a ton of pipe, delivered and ready for use.

Comment and Discussions

Readers' opinions on matters that concern engineers and contractors

Labor Productivity

Sir: It is easy to ignore the fact that a percentage decline in labor productivity increases labor costs of any product much more than does an equal percentage rise in wages. This is demonstrated as follows:

Assume that, at normal efficiency, a workman paid a dollar an hour turns out 3 units of a product in one hour. The labor cost per unit is 33⅓¢.

If the hourly wage is increased to $1.33⅓, while labor productivity remains as before, the unit cost is then 44.4¢, an increase of 33⅓%.

If the hourly wage remains at $1.00, while labor productivity drops 33⅓%, then two instead of three units will be produced in an hour at a labor cost of 50¢ per unit. This is an increase of 50% of the original cost of 33⅓¢.

If the hourly wage is increased to $1.33⅓, and the labor productivity drops 33⅓%, then two units will be produced at a cost of 66⅔¢ per unit or double the original labor cost of 33⅓¢ per unit.

The important effect of labor productivity on costs cannot be emphasized too often, and ways to increase productivity deserve constant attention.

MORTON C. TUTTLE
Boston, Mass.

Stadia Transit Is British

Sir: In the article "War-developed Equipment for Peacetime Use" (*ENR* Jan. 13, 1946, vol. p. 928) reference is made to a German "Dahlta" stadia transit which is claimed to represent a great advance in design. A feature is made of the fact that the instrument solves the reduction formula graphically and permits horizontal distances to be read directly from the intercepts on the rod and vertical heights to be obtained in much the same manner.

Your attention is drawn to Jeffcott's Patent Direct Reading Tacheometer which was invented by Professor H. H. Jeffcott, Secretary, Institution of Civil Engineers, London many years ago (it is thought about the year 1915). This instrument is described in the 1923 catalogue of Messrs. Cooke, Troughton & Simms Ltd. England as being "the latest refinement instruments for determination of heights and distances by the subtense system of measurement. In appearance it resembles an ordinary tacheometer, but its essential difference consists in an arrangement of movable stadia lines, their distances apart being automatically controlled by the tilt of the telescope so that the "intercept" on the graduated staff multiplied by 100 always gives the correct horizontal distance, no matter what the angle of inclination may be. Differences of height are similarily dealt with, a different "intercept" being multiplied by 10 and no further calculations are necessary."

Four "Jeffcott" tacheometers have been in constant use in the Public Works Department of New South Wales for the past 13 years.

Credit for this convention should be accorded to a British scientist rather than a German.

R. E. DOYLE
Public Works Department of New South Wales, Sydney, Australia

Flat Slabs and Slab Bands

Sir: The article on slab-band floors by F. N. Severud (*ENR* Oct. 17, vol. p. 526) brings to mind comparative designs made by the writer in 1913-1914 for a railroad terminal wherein the comparison was made between a four-way flat-slab versus a wide-beam design with the intervening slab figured between points or lines of inflection between beams. The writer at that time was pleased to find that the slab could be reduced to practically the same thickness as that of the four-way flat slab between drop panels.

Here the similarity with Mr. Severud's finding ceases. For not only was the flat slab more economical than the other, but it had a sufficient margin to overcome the royalty that had to be paid for the license to design by that method, which was patented and the patent for which had not yet expired. The economy lay not only in the saving in the forms, but in that of the concrete, though there was but a small difference in the amount of steel reinforcing required. Mr. Severud, in comparing the slab bands with the flat slab, notes that the column bands "are much more heavily reinforced than the middle strips." The writer would call attention to the fact that in the slab-band design the reinforcement is also much heavier in the beams than in the slab, corresponding to the same relationship of column strip and middle strip in the flat slab. However, it may be stated that partitions did not enter into the estimate, since there were none.

Incidentally, it appears to the writer that 8¼-in. spacing of bars in a 5-in. slab, where the effective depth would be about 4 in., is rather wide spacing. Lighter bars with closer spacing might have been a better detail.

It might be interesting to note that several years ago the writer used the wide beam or slab band for the design of one of the elevated platforms for the Diesel Shop at Scranton, Pa., where the column spacing precluded the use of the two-way flat slab design used in the other platforms.

M. HIRSCHTHAL
Concrete Engineer
The D., L. and W. Railroad Co.
Hoboken, N. J.

Nalyeds in Permafrost Regions

In the article on this subject—the prevention of the formation of surface ice at undesirable locations (*ENR* Nov. 28, 1946, vol. p. 726)—an error occurs in the second sentence of the caption to Fig. 3. As published, the sentence read "Such protected ditches could carry water *through a roadway fill* which otherwise might form a nalyed-creating barrier." The sentence should have read *away from* instead of "*through* a roadway fill." The sentence was added to the original manuscript by the editor, so that the error is his and not chargeable to Professor Tschebotarioff, who translated the article from the Russian.

UNIT PRICES BID BY CONTRACTORS

Bridge over Stony Creek, Anne Arundel Co., Maryland

OWNER: Maryland State Roads Commission, Walter C. Hopkins, Bridge Engineer.

PROJECT: Construction of bridge over Stony Creek, near Riviera Beach, Maryland. Bridge to be of steel I-beam construction with steel girder bascule span allowing 40 ft. of clear channel and concrete floor on fixed spans. Total length of bridge, center to center end bents, 885 ft.; approach spans to be approximately 54 ft., center to center bents.

CONDITIONS: Transportation to the job site either by the Fort Smallwood Road (Route 173) to Stony Creek or by water from Chesapeake Bay. Contract time is 300 working days. Prevailing wages for structural ironworkers are $1.90 per hour, for hoisting engineers, $1.625 to $2.00, and for common labor, $0.95.

BIDS: Four bids were received August 13, 1946, ranging from the contract low of $794.274 to $1,045,311.

LIST OF BIDDERS:

1. Whiting-Turner Contracting Co., Baltimore, Md. (contract) $794,274.00
2. McLean Contracting Co., Baltimore, Md. 842,494.90
3. Baltimore Contractors, Inc., Baltimore, Md. 1,023,588.00
4. Empire Construction Co., Baltimore, Md. 1,045,311.00

Item	Quantity	Unit Prices (1)	(2)	(3)
1. Clearing and grubbing	lump sum	$1,884.00	$400.00	$10,000.00
2. Class no. 1 excavation	3,700 cy	1.26	.70	.80
3. Class no. 2 excavation	500 cy	2.00	2.00	1.50
4. Class no. 5 excavation	50 cy	4.00	4.00	2.00
5. Borrow excavation	29,800 cy	.78	.80	1.10
6. Tamped fill	400 cy	1.50	1.50	1.00
7. Sodding	900 sy	.90	1.00	.80
8. Trimming exist. ditches	500 lf.	.35	.25	.40
9. Removal of exist. pavement	2,200 sy	.90	.80	1.20
10. Removal of exist. bridge	lump sum	11,011.00	15,000.00	27,000.00
11. Macadam base course	10,300 sy	1.05	1.10	1.30
12. Screen. for mac. base crse.	850 ton	3.78	4.00	4.00
13. Calcium chloride	6 ton	52.50	50.00	50.00
14. Gravel surf. main. traf.	200 cy	3.70	2.00	4.00
15. Gravel surf. crse.-entr.	400 sy	.76	.80	.80
16. Gravel surf. crse.-shldr.	5,700 sy	.76	.60	.80
17. Penetr. mac. surf. crse-3"	10,300 sy	.81	.80	1.30
18. Bit. mat. for penetr. mac.	37,800 gal	.126	.13	.14
19. Bit. surf. crse-spec. C	175 ton	12.35	13.00	8.00
20. Top dressing	9 ton	11.60	12.00	10.00
21. Perf. corr. met. pipe underdrain-6"	200 lf	1.58	1.25	1.50
22. Corr. met. pipe outlets-6" underdrain	50 lf	1.58	1.20	1.50
23. Arc. sec. cor. met. pipe 18" x 11" A. C.	194 lf.	2.63	3.60	3.50
24. Arc. sec. corr. met. pipe 29" x 18" A. C.	36 lf	3.68	6.00	5.00
25. 18" diam. A. C. C. M. pipe	60 lf	2.75	3.50	3.00
26. 24" diam. A. C. C. M. pipe	182 lf	4.20	6.00	4.00
27. Remove old pipe culverts	100 lf	1.10	2.00	1.00
28. Relaid old pipe culverts	100 lf	1.10	3.00	1.50
29. Aggreg. backfill underdrain	30 cy	4.50	6.00	3.50
30. Timber test piles	230 lf	5.60	3.00	4.00
31. Tr. Cl. A timber piles	8,400 lf	3.60	3.00	4.50
32. Prec. concr. test piles	680 lf	21.00	20.00	20.00
33. Prec. concrete piles	13,500 lf	13.65	11.50	18.00
34. Test loads	2 ea	3,150.00	3,000.00	5,000.00
35. Class X concrete	530 cy	49.75	75.00	75.00
36. Class A concrete	1,425 cy	67.90	68.50	60.00
37. Concrete in barricades	20 cy	60.00	50.00	40.00
38. Concrete in counterweights	60 cy	41.50	50.00	45.00
39. Cl. A concr. in pipe endw.	20 cy	50.00	60.00	60.00
40. Reinforcing steel bars	300,000 lb	.0655	.10	.12
41. Fabr. struct. steel bascule span, etc.	335,000 lb	.181	.20	.25
42. Fabr. struct. steel fl. span and appr. span	835,000 lb	.108	.13	.15
43. Misc. metal	14,000 lb.	.342	.60	.50
44. Stringer spirals	14,000 lb	.50	.75	.75
45. Open grating in roadway	1,490 sf	4.00	6.50	4.50
46. Open grating in sidewalk	420 sf	4.90	7.00	4.00
47. Filled grating in sidewalk	110 sf	8.82	10.00	8.00
48. Trunnions and bearings	12,000 lb	.67	.75	.80
49. Operating machinery	35,000 lb	1.054	1.00	1.20
50. Cast iron balance blocks	20,000 lb	.065	.15	.15
51. Water service line	lump sum	3,361.00	5,000.00	3,575.00
52. Treated timber	11 Mbm	638.50	600.00	450.00
53. Dampproofing	lump sum	235.00	500.00	200.00
54. Exp. mat. in bridge	lump sum	612.00	50.00	300.00
55. Electrical work	lump sum	44,000.00	55,000.00	56,800.00
56. Control house	lump sum	18,166.00	25,000.00	36,800.00
57. Metal railing	1,600 lf	10.75	10.00	8.00
58. Concrete gutter 8"	75 sy	4.20	5.00	16.00
59. White face comb. curb and gutter	240 lf	2.42	2.50	8.00
60. Riprap	500 sf	10.00	25.00	6.00
61. Guard rail-3-cable	1,888 lf	1.58	1.75	3.00
62. End anchor for grd. rail	10 ea	42.00	50.00	45.00
63. Interm. anchor for grd. rail	1 ea	95.00	100.00	80.00
64. Maintenance of traffic	lump sum	6,506.00	3,000.00	10,000.00
65. Grates for type J inlets	2 ea	210.00	100.00	75.00
66. White cem. concr. curb 8" x 22"	200 lf	2.35	2.50	3.50
67. Seeding and mulching	6,800 sy	.32	.25	.30

Bay Shore Freeway, San Mateo Co., California

OWNER: State Division of Highways, Sacramento, California; G. T. McCoy, State Highway Engineer.

PROJECT: Construction of Bay Shore Freeway from Colma Creek in South San Francisco to Broadway Ave. in Burlingame, San Mateo County. Project will provide a 6-lane divided highway, 5.1 miles long, with no grade crossings, but traffic interchange structures at San Bruno Ave., Mills Airport, Millbrae Ave., and Broadway Ave. Contract provides for construction of vertical sand drains and for a heavy layer of imported borrow material over the marshy tide flat portions. Asphalt concrete paving will be used on a crusher run base.

CONDITIONS: This project is one of the first units of the development of the old Bay Shore Highway between San Francisco and Palo Alto into a freeway. The work called for by the contract consists of the relocation of the route to the west of the existing Bay Shore Highway so that the city and county of San Francisco may expand the airport facilities at Mills Field.

Contract is scheduled for completion November 10, 1947. Minimum skilled labor wage rates are $1.375 per hour, and minimum semi-skilled and common labor rates are $1.25 per hour.

BIDS: Five bids were received September 18, 1946, ranging from the contract low of $2,993,138 to $4,656,694.

LIST OF BIDDERS:

1. Macco Const. Co., Oakland, Calif. and Morrison-Knudsen, San Francisco, Calif. (contract) $2,993,138
2. Case American Const. Co., San Pedro, Calif. 3,291,005
3. Guy F. Atkinson Co., South San Francisco, Calif. 3,365,440
4. Charles L. Harney, San Francisco, Calif. 4,128,363
5. Eaton & Smith, San Francisco, Calif. 4,656,694

	Item	Quantity	Unit Prices (1)	(2)	(3)
1	Remove concrete	1,500 cy	$4.25	$4.00	$5.00
2	Clear and grub	lump sum	1,000.00	1,000.00	15,000.00
3	Roadway excavation	500,000 cy	.28	.50	.30
4	Structural excavation	19,000 cy	2.50	2.00	2.40
5	Ditch and channel excavation	3,000 cy	1.45	1.00	1.25
6	Overhaul	1,500,000 st y	.01	.006	.006
7	Vertical holes sand drains	235,000 lf	.63	.60	.60
8	Sand backfill sand drains	33,000 ton	2.10	1.75	1.80
9	Fill material for sand drain blanket	44,000 ton	2.00	2.00	2.10
10	Cl. C and Cl. D subgrade	1,200 sy	.30	.15	.25
11	Finish roadway	270 st	30.00	35.00	80.00
12	Crusher run base	148,000 ton	2.00	2.30	2.25

Bay Shore Freeway, San Mateo Co., California

Continued from preceding page

13	Asphalt emulsion paint binder and seal coat	120 ton	22.00	25.00	22.50
14	Screenings armor coat	4,100 ton	5.30	4.00	4.20
15	Liquid asphalt SC-6 armor coat	196 ton	21.00	25.00	22.00
16	Liquid asphalt SC-1 prime coat	78 ton	20.00	25.00	21.00
17	Asphalt concrete leveling course	40,000 ton	5.00	4.40	4.90
18	Asphalt concrete type A surface	24,000 ton	5.20	4.70	5.00
19	Asphalt concrete raised bars	60 lf	2.00	2.00	2.00
20	Cl. B portland cmt. concr. base and parking strip	210 cy	20.00	14.00	16.00
21	Redwood timber	1.4 Mbm	280.00	350.00	250.00
22	Cl. A portland cmt. concr. structs.	3,950 cy	34.00	50.00	50.00
23	Heavy stone riprap	1,300 cy	5.50	5.00	3.75
24	Cl. B portland cmt. concr. curbs and gutters	1,560 cy	30.00	25.00	32.00
25	Curb dowels	100 ea	.25	.25	.30
26	Cl. B portland cmt. concr. sidewalks	64 cy	29.00	25.00	35.00
27	Monuments	120 ea	5.50	5.00	5.00
28	Center line monuments	32 ea	48.00	20.00	22.50
29	Metal plate guard rail	7,500 lf	1.80	2.10	2.75
30	Culvert markers	280 ea	6.00	3.00	4.50
31	Guide posts	500 ea	6.00	3.50	4.00
32	Chain link fence	2,200 lf	1.90	1.75	1.80
33	New prop fence	10.5 mi	1,450.00	2,000.00	2,200.00
34	Reinforced concrete pipe—24 in	630 lf	4.50	4.00	4.00
35	Reinforced concrete pipe—36 in	380 lf	7.80	7.50	7.00
36	Reinforced concrete pipe—42 in	180 lf	10.00	9.00	10.00
37	CMP 16 gauge—12 in	1,420 lf	1.80	1.75	2.00
38	CMP 16 gauge—18 in	4,100 lf	2.80	2.50	3.00
39	CMP 14 gauge—24 in	2,380 lf	4.10	4.00	4.00
40	CMP 12 gauge—36 in	1,700 lf	7.60	7.75	7.00
41	CMP 12 gauge—48 in	210 lf	11.00	13.50	12.00
42	Auto drainage gates—18 in	1 ea	60.00	50.00	60.00
43	Auto drainage gates—24 in	2 ea	90.00	70.00	75.00
44	Manholes	2 ea	300.00	150.00	150.00
45	Adjust manholes to grade	6 ea	170.00	50.00	90.00
46	Salvage exist. pipe culverts	100 lf	2.50	1.50	2.50
47	Furnish bar reinforcing steel	670,000 lb	.06	.05	.055
48	Place bar reinforcing steel	60,000 lb	.03	.03	.04
49	Miscellaneous iron and steel	4,000 lb	.55	.35	.35
50	Lighting standards	85 ea	300.00	375.00	400.00
51	Conduit—1½ in	12,000 lf	2.00	2.00	2.00
	Alternate A:				
52	Hydraulic dredger fill	1,850,000 cy		.85	
53	Develop water supply and furnish water equip			2,000.00	
54	Apply water	4,000,000 gal		2.00	
	Alternate B:				
55	Import borrow, type A	1,270,000 ton	.47		.535
56	Import borrow, type B	1,800,000 ton	.44		.535
57	Develop water supply and furnish water equip		15,500.00		15,000.00
58	Apply water	58,000,000 gal	.25		1.00

Three Bridges over Caney River, near Bartlesville, Oklahoma

OWNER: State Highway Department, Oklahoma City, Okla.; H. E. Bailey, Engineer.

PROJECT: Construction of three reinforced concrete bridges over Caney River near Bartlesville, Oklahoma. Bridges, of "I" beam girder construction, are to be 160 ft., 240 ft., and 180 ft. long respectively.

CONDITIONS: Area is subject to flash floods. Access to job site is provided by U. S. Highways 60 and 66. The Santa Fe and Katy Railroads serve Bartlesville which is 2 miles from the projected bridges. Contract time is 8 months. Skilled wages approximate $1.50 per hour, semi-skilled, $1.00, and common labor, $.75.

BIDS: Only two bids were received September 24, 1946, the low bid of $262,262.88, and $289,005.28.

LIST OF BIDDERS:

1. J. A. Raines, Muskogee, Okla. (contract) $262,262.88
2. Gordon Walker, Baton Rouge, La. 289,005.28

	Item	Quantity	Unit Prices (1)	(2)
	Bridge # 1			
1	Substructure excavation common	325 cy	$7.63	$3.85
2	Class A concrete	201.2 cy	37.00	36.00
3	Class AA concrete	899.1 cy	37.70	46.00
4	Reinforcing steel	223,910 lb	.10	.077
5	Concrete test pile	2 ea	550.00	700.00
6	Reinforced concrete piling	4,695 lf	6.15	5.00
7	Black traffic stripe—6"	501.33 lf	.20	.25
8	Black traffic stripe—24"	1,002.66 lf	.40	.50
	Bridge # 2			
9	Substructure excavation common	6,090 cy	7.63	3.85
10	Substructure excavation rock	261.6 cy	24.00	15.00
11	Class A concrete	551.9 cy	37.00	36.00
12	Class A concrete pier base	563.8 cy	39.00	37.00
13	Class AA concrete	82.4 cy	37.70	46.00
14	Reinforcing steel	93,850 lb	.10	.077
15	Reinforced concrete piling	1,276 lf	6.15	5.00
16	Black traffic stripe—6"	63 lf	.20	.25
17	Black traffic stripe—24"	26 lf	.40	.50
	Bridge # 3			
18	Substructure excavation common	325 cy	7.63	3.85
19	Class A concrete	171.2 cy	37.00	36.00
20	Class AA concrete	674.7 cy	37.70	46.00
21	Reinforcing steel	170,670 lb	.10	.077
22	Reinforced concrete piling	4,069 lf	6.15	5.00
23	Black traffic stripe—6"	421.33 lf	.20	.25
24	Black traffic stripe—24"	842.66 lf	.40	.50

Improvements to Bachman Water Purification Plant, Dallas, Texas

OWNER: City of Dallas, Texas, Dept. of Waterworks.

PROJECT: Additions and improvements to Bachman Water Purification Plant, consisting of primary basin no. 3, flocculator, mixer, and appurtenant work. Plant is located 6 miles northwest of the business district of Dallas, Texas.

CONDITIONS: The Denton Branch of the Missouri, Kansas, and Texas Railroad provides access to the job site. Contract time is 230 calendar days. Stipulated wage rates are: plumbers, $1.75; electricians, $1.625; power shovel operators, $1.625; carpenters, $1.425; concrete mixer operator (less than 5 sack size), $1.375; pump operator, $1.125; pipe fitter, $.75; pipe layer, $.75; and common labor, $.70.

BIDS: Five bids were received September 11, 1946, ranging from the contract low of $555,464.00 to the high bid of $657,438.64.

LIST OF BIDDERS:

1. J. G. Bartholemew Co. (contract) $555,464.00
2. T. C. Bateson Co. 559,395.00
3. Dolph Construction Co. 597,473.00
4. J. W. Bateson Co. 599,225.00
5. Noggard & Shaw and Vilbig Bros. 657,438.64

	Item	Quantity	Unit Prices (1)	(2)	(3)
1	Basin and flocculator no. 3	lump sum	$278,920.00	$252,765.00	$259,000.00
2	Mixing basin	lump sum	52,480.00	66,500.00	59,000.00
3	Cast iron water pipe—48"	1,405 lf	44.20	34.00	55.00
4	Cast iron water pipe—42"	775 lf	36.40	33.00	47.00
5	Cast iron water pipe—36"	120 lf	5.20	20.00	20.00
6	Cast iron water pipe—30"	170 lf	22.70	31.00	30.00
7	Cast iron water pipe—24"	50 lf	19.00	25.00	24.00
8	Cast iron fittings	70 ton	365.00	395.00	372.00
9	Wash water meter	lump sum	7,710.00	7,800.00	7,560.00
10	Raw water meters	lump sum	12,490.00	15,200.00	16,380.00
11	Sluice gates—48"	3 ea	1,650.00	2,300.00	1,794.00
12	Gate valves—54"	2 ea	5,125.00	6,350.00	5,076.00
13	Gate valves—48"	3 ea	4,915.00	4,800.00	4,823.00
14	Gate valves—42"	2 ea	3,650.00	4,400.00	3,575.00
15	Gate valves—36"	3 ea	120.00	725.00	300.00
16	Gate valves—30"	1 ea	70.00	275.00	250.00
17	Gate valves—24"	1 ea	800.00	700.00	785.00
18	Gate valves—18"	1 ea	530.00	450.00	520.00
19	Gate valves—12"	3 ea	230.00	300.00	220.00
20	Gate valves—8"	1 ea	130.00	200.00	125.00
21	Gate valves—6"	1 ea	120.00	125.00	115.00
22	Pipe vault	1 ea	6,000.00	6,500.00	8,000.00
23	Venturi meter box	1 ea	2,660.00	2,800.00	4,000.00
24	Overflow well	1 ea	3,550.00	2,300.00	2,000.00
25	Outlet structure	1 ea	420.00	230.00	250.00
26	Outlet well	1 ea	700.00	1,560.00	650.00
27	Valve vault—54"	1 ea	3,040.00	3,000.00	5,000.00
28	Alteration to no. 1 36" raw water line	1 ea	560.00	8,000.00	1,400.00
29	Alteration to no. 2 36" raw water line	1 ea	4,100.00	8,400.00	18,200.00
30	Connection to aerator	1 ea	630.00	2,700.00	1,960.00
31	Connection to mixing basin	1 ea	1,110.00	5,300.00	4,200.00
32	Water main—4"	1 ea	730.00	850.00	1,820.00
33	Lead lined coagulant line—4"	1 ea	2,840.00	2,400.00	2,912.00
34	Elictrical distribution system	1 ea	9,660.00	8,300.00	10,193.00
35	#1500 concrete	500 cy	13.25	14.50	12.00

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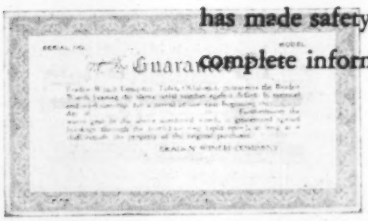

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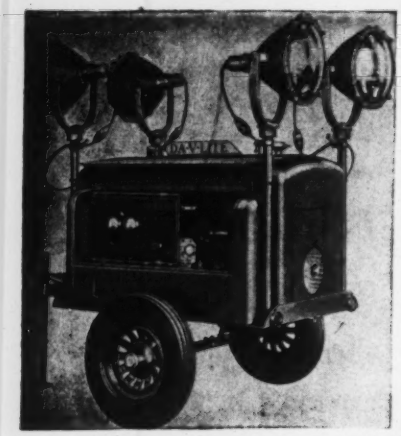
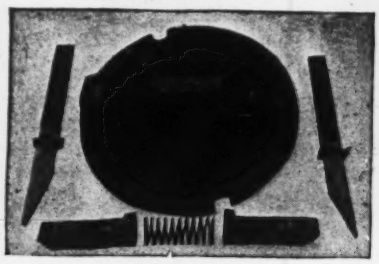
Calculating Device—Device for measuring radiation for steam and hot water heating systems consists of round dial with three concentric celluloid printed discs. It is said to eliminate tedious figuring and can be used successfully by anyone without previous technical training. Its operation is rapid, not involving subtractions, divisions, complicated multiplication, nor use of formula. Dial contains sizes of mains, returns, risers, radiator sizes and capacities, round and sectional boiler net ratings, chimney flue sizes and capacities with minimum and maximum heights, hot water tank sizes and capacities, fuel oil tank sizes and capacities, hot water generator capacities and other valuable heating information.—*Heat-O-Meter, 424 W. 42nd St., New York 18, N. Y.*



Portable Lighting and Power Units—Each of four new Da-V-Lites is built around 5000-w. Westinghouse self-excited, self-regulated A-C generator, driven by 15-hp., four-cylinder Wisconsin air-cooled engine, equipped with electric starter. Four standard models are floodlight, searchlight, combination and beacon. All are available in skid and two-wheel spring trailer mountings. Trailer machines are 9 ft. long 7½ ft. high and 5 ft. wide. Weight is approximately 1,750 lb.—*Davey Compressor Co., Kent, Ohio.*

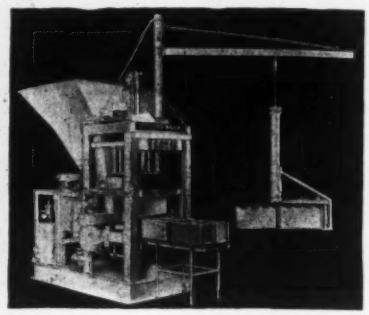
Cathodic Rectifier Unit—This unit stops rust and corrosion by eliminating electrolytic action on metal being protected. Flow of current in tank or pump is reversed by introducing cathode which is charged by rectifier. Metal of tank or pump thereby becomes cathode and is not subject to corrosion or rust. Unit is contained in weatherproof steel cabinet and has a D-C output capacity of 2-5 amp. at 31-50 v. (100 to 150 D-C. w.), sufficient to protect submerged areas up to 10,000 sq. ft. Preferred A-C input is 110-3-60. Step controls up to 50 D.A. with moving coil type ammeter and voltmeter are standard.—*Trimount Instrument Co., 37 W. Van Buren St., Chicago 5, Ill.*



Manhole Lids—Self-locking manhole lids can be installed on present base thus eliminating necessity of digging up highway. Single-arm type is used on lids of less than 28-in. diameter and double arm on all larger lids. They can be removed with two wedge bars and a sledge, which prevents the holes from being uncovered by unauthorized persons or car or truck wheels.—*Frank T. Dixon, Manufacturer, 3409 Beale Ave., Altoona, Pa.*

Adjustable Curve Drafting Instrument—This instrument forms arcs of circles over wide range of adjustments and may be calibrated in degree or radius of curvature to any scale desired. It is available with or without irregular curve adjustments. Instrument 1½ ft. long has 0- to 4-deg. range or 12 ft. to infinite. It is now being used in state highway drafting departments for highway curve plotting.—*Albert G. Daniels, 109 Chalmers St., Winnsboro, S. C.*

Stray Current Control System—Current and voltage-sensitive device operates jointly on high-current contactor, functioning of which depends on amount of current or potential present in pipe. Standard telephone-type pole cable terminal mounting is used to house the stray current control system. Unit is 26 in. high and 8 in. in dia., not including contactor. Ready for installation, it weighs about 40 lb.—*Cook Research Laboratories, Chicago, Ill.*



Vibrating Stripper—Lith-I-Block machine is automatic, plain pallet, vibrating stripper, simple and compact in design. Use of air for automatic pallet feed, stripper head, pallet support and feed draw reduce maintenance to minimum. Machine produces two 8-in. blocks per cycle of operation with rated capacity of 480 8-in. blocks per hour. All standard sizes of block, as well as brick and chimney block can be produced on this machine, all on plain pallet. Changes to various sizes are accomplished rapidly by interchanging hardened abrasion resistant mold box liners and cores. Machine has unique control, inasmuch as operator of off-bearer, by means of electric control switch on off-bearing device, can hold stripper head up for inspection, removal of foreign matter, or can drop it any number of times at will.—*Lith-I-Bar Co., Holland, Mich.*

Gantry Crane—Portability, ease in handling and flexibility for many varied lifting services are the features of a new gantry crane. Of 1-ton capacity with generous safety factor and minimum gantry weight, it has a broad variety of uses at loading platforms and docks, in power plants and machine shops, factories and garages and for construction, maintenance and farms.—*Industrial Equipment Co., 315 N. Ada St., Chicago 7, Ill.*

Support the roof at your working faces with *Alcoa Aluminum Beams*

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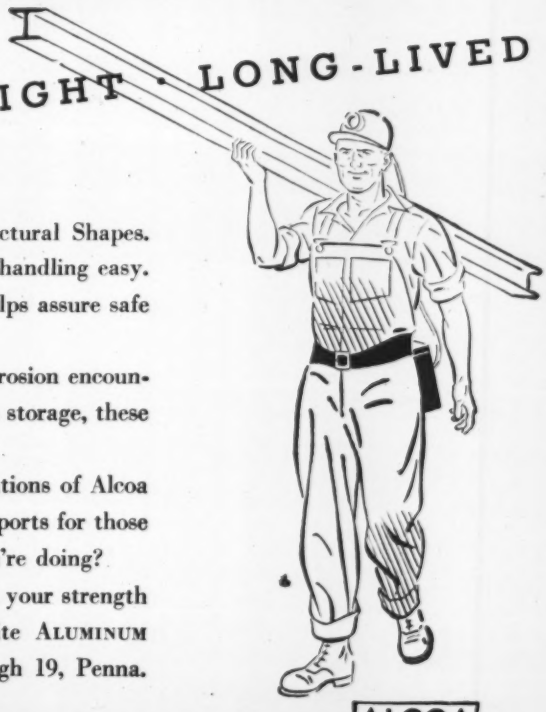

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ASK ABOUT THE NEW EQUIPMENT LINE FOR CONCRETE CURING COMPOUND APPLICATION

Manufacturers' Activities

GYPSUM ASSOCIATION, Chicago, announces removal of its offices Dec. 1, 1946, to 330 South Wells St., Chicago 6, Ill.

SKILSAW, INC., Chicago manufacturer of portable electric tools, has announced the purchase of the Forss Pneumatic Tool Co. of Aurora, Ill., manufacturer of a general line of small, portable pneumatic tools. As a result of the acquisition, Skilsaw will be able to supplement its line of portable electric tools with a line of portable pneumatic tools.

LIQUID CONDITIONING CORP. of New York City, manufacturers of Liquid equipment for all water softening and liquid conditioning processes and Liquonex Zeolites, announces the appointment of the following engineering sales representatives: John B. Foley, Syracuse, N. Y.; Arthur W. Schuster, Rochester, N. Y.; Brookman-Hazel Associates, Buffalo, N. Y.; The Herr-Harris Co., Pittsburgh, Pa.; P. O. Stribling, Jr., Greensboro, N. C.; and The Dorner Co., Milwaukee, Wis. These concerns also represent the Griscom-Russell Co., Massillon, Ohio.

JOHN M. LAMBERT has been appointed manager of consumer sales of York Corp., according to J. R. Hertzler, vice president and general sales manager. He will supervise all air conditioning and refrigeration sales made direct with users, and will be supported by Fred C. Wood, manager of air conditioning sales and James Scott, manager of refrigeration sales.

LOUIS M. KUILEMA, formerly district sales manager at the Cincinnati office of Pennsylvania Salt Manufacturing Co. has been placed in charge of the Wisconsin territory as district sales manager. He is located at 20 N. Wacker Drive, Chicago.

DUKE EQUIPMENT CO., Montreal, announce the appointment of F. W. Dickie to their sales force, at the Halifax, N. S., office.

Appointment of CONTRACTORS MACHINERY CO., INC., Kansas City, Mo., as distributor of Davey compressors was announced recently by Paul H. Davey, president, Davey Compressor Co. The new distributor will offer complete sales and service facilities on all items of Davey manufacture.

From one end of the world to the other, you'll find Gar Wood Hoists and Dump Bodies in action. The reason? They're designed, engineered, and built to do specific jobs, *no matter how tough*. Hydraulically operated, with simple controls... they dump *cleanly*, *quickly*, and *easily*... make it possible to get to the next job faster.

No matter what kind of material you work with... sand, gravel, rock, coal, or construction materials... there's a Gar Wood Hoist and Dump Body to make the job easier... help you make money, faster.

Gar Wood Hoists and Dump Bodies have been, and are constantly being proven all over the world on the toughest jobs. For *your* next job, specify Gar Wood.

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The man who knows and uses measuring tapes instantly recognizes the superiority of WYTEFACE "A" Steel Tapes. Raised black graduations and rims, on a crack-proof white surface, make these steel tapes as easy to read in the brightest glare as in the dimmest light. See WYTEFACE "A" heavy duty and general purpose steel tapes at your dealer's, or write for catalogue.

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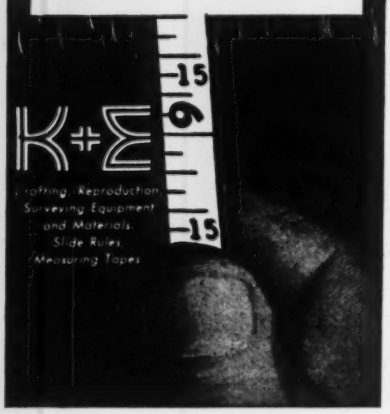

Manufacturers' Publications

Diesel Tractor—(32-p. catalog) Describes HD-14 diesel "crawler" tractor. Action photos plus cutaway views of important parts are liberally distributed throughout the booklet. Stories on the "pusher" technique, two-cycle diesel power, grease-packed truck wheels, four-way cooling and track design are presented. Special pages are devoted to allied equipment, auxiliary attachments and specifications.—*Allis-Chalmers Mfg. Co., Tractor Division, Milwaukee 1, Wis.*

Vertical Centrifugal Pump—(6-p. bulletin) Describes design, construction and application of three types of vertical centrifugal pumps for general purpose pumping in wide variety of industrial services such as sump and drainage pumping, general water supply, mine station service, cooling tower service, etc. It illustrates all three types, including comprehensive parts diagrams. — *Peerless Pump Division, Food Machinery Corp., 301 West Avenue 26, Los Angeles 31, Calif.*

Underground Pipe Lines — (4-p., two-color bulletin) Gives up-to-date description of Therm-O-Tile and its advantages. One section relates to waterproofing of Therm-O-Tile for submerged conditions.—*H. W. Porter & Co., 825 Frelinghuysen Ave., Newark, N. J.*

Color Dynamics—(61-p. reference manual) Outlines what color is, various characteristics of color, and where, when, why and how color should be used in industrial plants, institutions and other specialized fields. — *Pittsburgh Plate Glass Co., Grant Bldg., Pittsburgh 19, Pa.*

Rust Prevention—(Descriptive catalog) Outlines the qualities of company's rust preventive products for industrial, railroad, marine, farm and general uses. Problems of scientific rust control, together with directions for use and application of Rust-Oleum are given in the catalog's first section. Specifications are organized for easy reference through the use of 39 color cards, augmented by 12 color panels of machinery and implement finishes. Third section outlines recommendations and inside back cover contains handy index of products in new post war line. —*Rust-Oleum, 2425 Oakton St., Evanston, Ill.*

Asbestos Protected Cables — (8-p. bulletin) Describes principal types of Okobestos heat corrosion resistant wires and cables, including power cables, apparatus cables, multi-conductor control cables, switchboard wires and appliance wire.—*Okonite Co., Passaic, N. J.*

Hollow Wall System—(12-p. booklet) Describes non-bearing system for use in steel and masonry construction and contains detailed architectural tracings showing methods of handling electrical work, door bucks, and other features.—*National Gypsum Co., Buffalo 2, N. Y.*

Illumination Design—(8-p. folder) Gives information for designing interior lighting installations. Essential information is contained in easily-read tables covering popular types of luminaires, lamps and ballasts. Special emphasis is placed on maintenance with range of values being given for each luminaire. In addition to generally used method of determining average illumination values, tables and curves are given which will permit calculation of illumination at various points when produced by direct lighting unit such as reflector and projector lamp. — *Westinghouse Electric Corp., Bloomfield, N. J.*

Pipe and Fitting Materials—(9x14-in. chart) Deals with carbon, intermediate alloy, stainless and special analysis steels, and covers ASTM specifications, chemistry, service limitations and welding procedure.—*Tube Turns, Inc., Louisville 1, Ky.*

Radial Arm Saws—(8-p. folder) Features new large-size saw and advanced design of drill press.—*T. H. Ball & Sons, 850 Euclid Ave., Cleveland, Ohio.*

Generators — (8-p. bulletin) Describes A-C and D-C generators of 50-w. to 200-kw. and 500-w. to 150-kw. capacity.—*Century Electric Co., St. Louis 3, Mo.*

Instruments — (6-p. folder) Describes gages, industrial instruments, safety valves, locomotive equipment and cranes and hoists.—*Manning, Maxwell & Moore, Inc., Chrysler Bldg., New York 17, N. Y.*

Hydraulic Control—(Two 4-p. bulletins) Describe Hy-Lo-Jack automatic power hydraulic control to provide speed operation for snow plows and road machinery.—*Monarch Road Machinery Co., Grand Rapids 4, Mich.*

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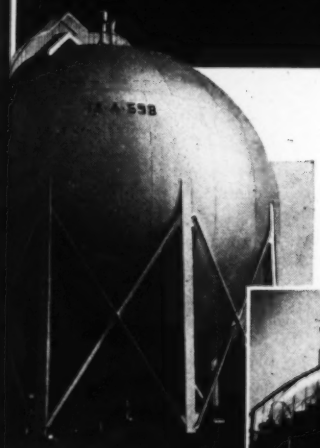

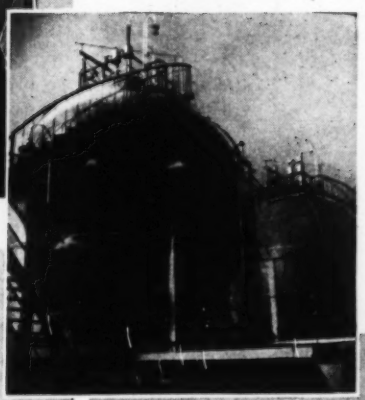

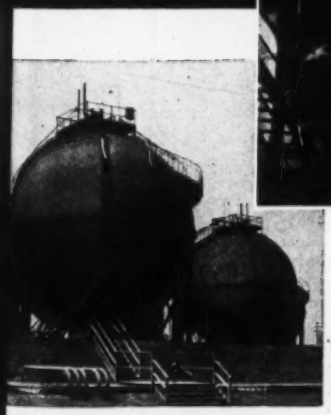

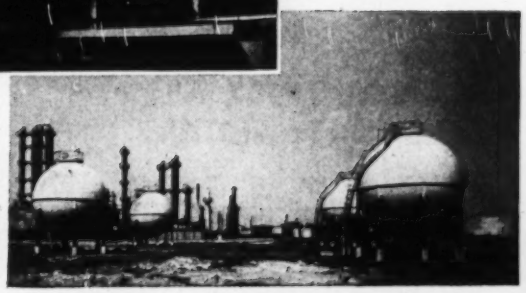

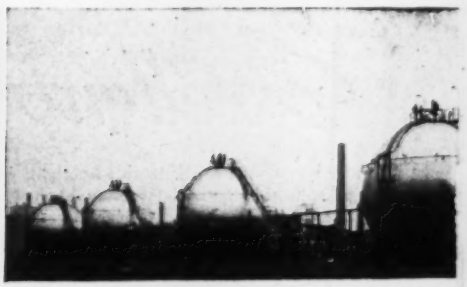

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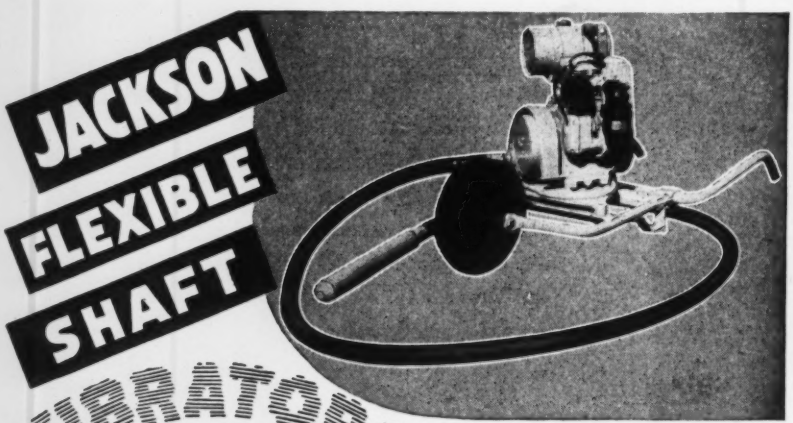

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This husky, self-contained, trouble-free unit, powered by a thoroughly dependable Wisconsin engine with automatic clutch, may be had with three vibrator heads for thick and thin sections, flexible shafting (½" core) in 7 to 14' lengths up to 28 ft. Full swivel, dirt-proof base. Variable speed control up to 7500 V.P.M. Wheelbarrow with drop handles is optional.

The JACKSON line contains the ideal vibrator (internal or external, hydraulic, flexible shaft engine or electric motor driven) for every type of concrete construction. Write for information on the type you are interested in.

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Elections and Activities

The board of representatives of the Iowa Engineering society has announced its nominations for society officers for 1947. The election will be by mail ballot and results will be announced at the annual meeting in Des Moines, Feb. 18 and 19. Nominated for president are: William P. Nemmers, Des Moines architect; John Tippee, Des Moines, city engineer; for vice-president, C. M. Stanley, Muscatine and Prof. Joseph K. Walkup, Iowa State college, Ames; for treasurer, E. F. Behrens and Dan S. Craig, both of Des Moines. Three district representatives are to be chosen from the following nominees:

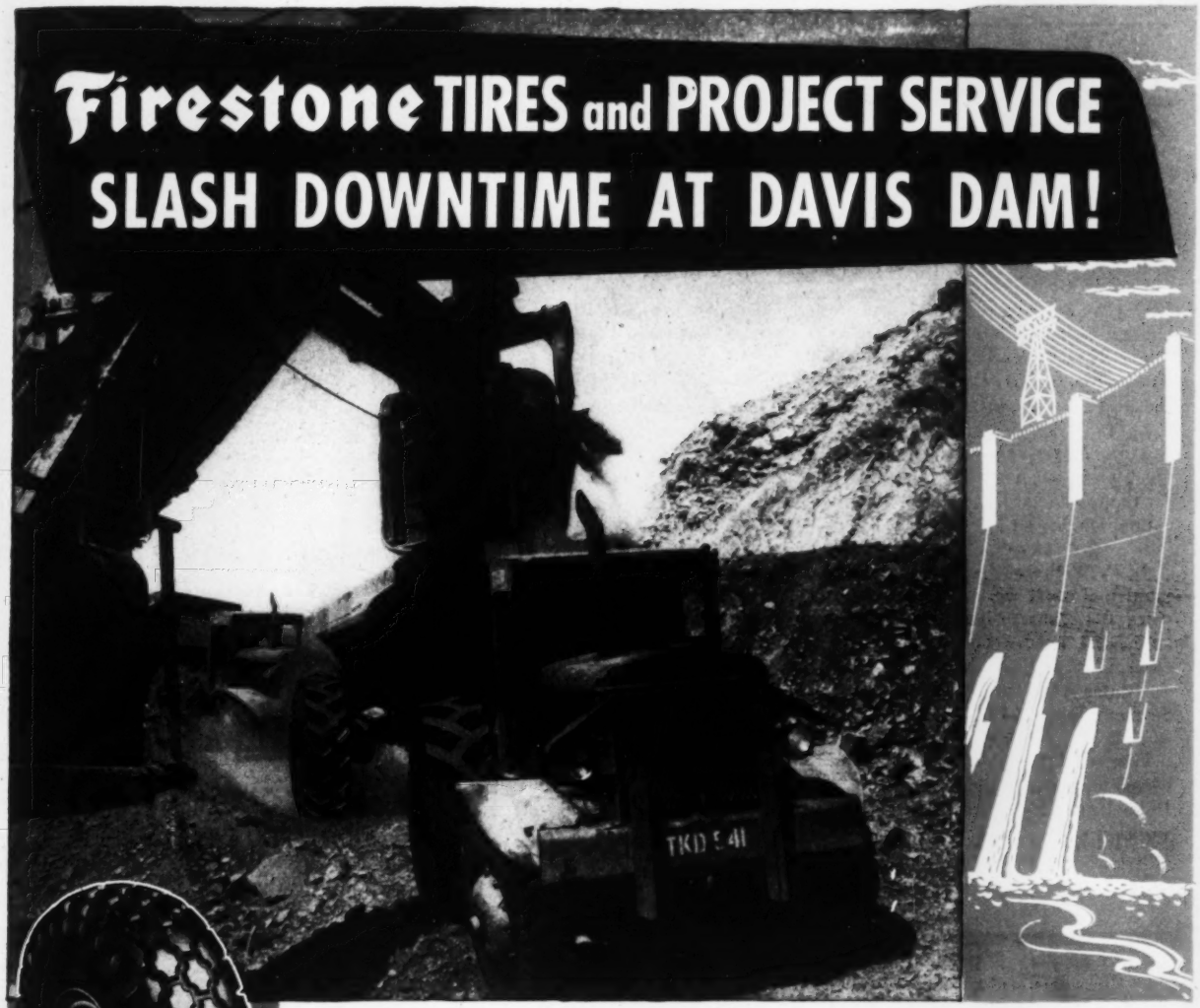
Districts, 1, 2 and 3—Wayne C. Furlong, John V. Gebuhr, B. F. Kenworthy, Frank O. Laing, Gerald F. Tigges and Ralph W. Tuller all of Des Moines. Districts, 4, 5 and 6—A. A. Baustain, Henry Giese, Carl P. Lechner, Mark Morris, Ralph A. Moyer and L. O. Stewart, all of Ames.

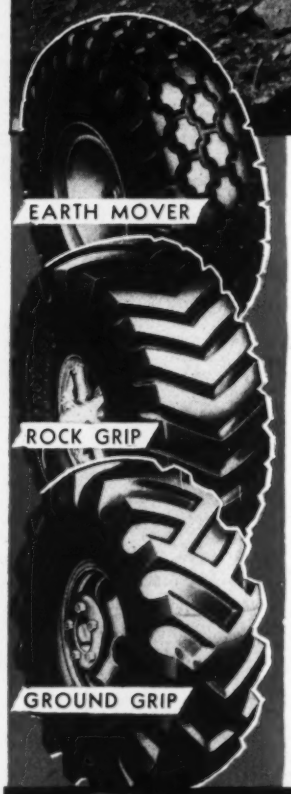
New officers of the Building Contractors' Association of California are: President, T. J. Lords, San Diego, succeeding E. C. Moller, Pasadena; Vern Huck, Los Angeles, first vice-president; George Strait, Pomona, second vice-president, and Harry Hanson, Los Angeles, secretary-treasurer.

A. J. Alexander, Akron, has been elected president of the Ohio Home Builders Association, succeeding Joseph B. Haverstick, Dayton. Earl Bailey, Youngstown, was named vice-president; David Spitznaugle, Toledo, secretary; and Nick Molnar, Cleveland, treasurer. Area vice-presidents named were: Earl F. Washburn, Columbus; John Dougherty, Canton; Ed Gansler, Youngstown; Harold Sturdevant, Toledo; Charles Sharp, Toledo; Joseph Novotny, Cincinnati; and Alex Treuhaft, Cleveland.

The Building Trades Employers Association of Milwaukee, Wis., has elected the following directors: A. A. Ornst, W. H. Emory, Jr., John H. Dahlman, John Steigerwald, Joseph P. Jansen, A. H. Koch, Henry Wissow, A. F. Wagner, W. T. Dorch, Louis Moosbrugger, Andrew Tornaro, Henry Jaeger, Henry Tews, Sylvester Price. Erwin Endlich, Harry Yarnpel, Sid Fuller, Paul J. Grunan, Geo. Toepfer, Joseph Di Forances, Harold Cafmeyer and Hans Wagner.

Firestone TIRES and PROJECT SERVICE SLASH DOWNTIME AT DAVIS DAM!





AT THE Davis damsite, Firestone Off-the-Highway tires and project service are writing a great new chapter in earth-moving history. Downtime, due to tire failure, has been virtually eliminated!

Utah Construction Company, operating company in the building of this huge earth and rockfill dam, has turned over to Firestone Dealer, Bailey, Inc., sole responsibility for the supplying and maintenance of all tires on the project. This equipment operates 24 hours a day over some of the roughest and hottest terrain in the country. Records show that downtime on dump trucks, scrapers, road patrols, tractors, trucks and trailers has been slashed to the vanishing point.

These same Firestone Off-the-Highway tires, and technical knowledge and project service are available to you in every part of the country. For complete information consult your nearest Firestone Dealer or Firestone Store.

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Firestone OFF-THE-HIGHWAY TIRES

Men and Jobs

R. A. Black, formerly district engineer, Canadian National R.R., Quebec City, and more recently transportation engineer for the system has retired.

Comdr. George S. Robinson (CEC), USN, has been named Naval officer in charge of construction at Camp Lejeune, N.C., succeeding **Comdr. John A. Scoville** (CEC), USN, who had held the post since August, 1945.

Jean Marie Thomas of Montreal, Que., has been named district engineer for the provincial Department of Colonization, Quebec.

E. P. Wicker, superintendent of the municipal water works at Sanford, N.C., since 1937, has resigned and has been succeeded by **B. L. King** of Mount Olive, N.C., who formerly was with the water works at Durham, N.C., and Seymour Johnson Field, N.C.

Fitzgerald Hudson, who recently received his degree in civil engineering at Duke University, Durham, N.C., now is working for the Armco Metal and Drainage Products Co., Atlanta, Ga.

James L. Williams, city engineer of West University Place, adjacent to Houston, Tex., has resigned to become a consulting civil engineer in Houston.

H. J. Friedman, engineer-director of Glynn County, Ga., for the last eight years, has resigned and will organize an engineering and construction firm at Brunswick. **W. E. Goff,** county superintendent of public works, also resigned to be associated with the firm.

Jerome F. Chladek, a civil engineer in the Milwaukee County, Wis., regional planning department for 10 years, has resigned to become a planner in the Milwaukee land commission.

Warren Stone has been employed as assistant city engineer at Shawnee, Okla. City Engineer Lloyd Cowan will work on the Shawnee Creek flood control project.

H. W. Frith, chief engineer of the Vancouver, B.C., harbor board, is retiring after 32 years' service with the National Harbors Board. He began with the first Vancouver harbor commissioners in 1914, and his first assignment was in connection with the construction of Granville Bridge.

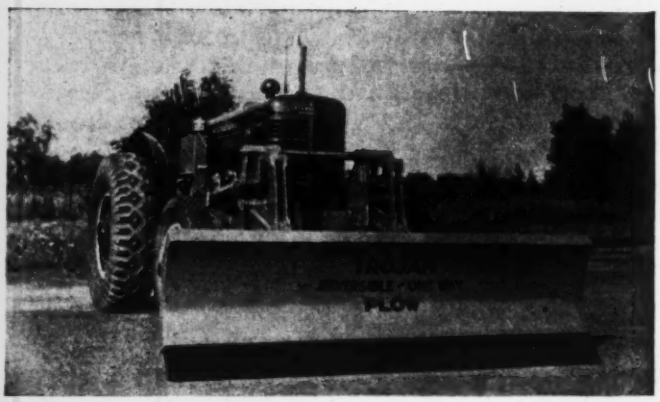
A. S. Porter who returned to the Cuyahoga County, Ohio, engineer's office as chief deputy after five years in the Navy as a commander in the Civil Engineers Corps in charge of dry dock construction, has been named county engineer to succeed **John O. McWilliams** who resigned Dec. 1. Mr. Porter, who was chief deputy engineer for eight years before his service in the Navy, was previously a member of the Cleveland Highway Research Bureau for three years. During his course in civil engineering at Ohio State University, Mr. Porter was employed part time by the City Planning Commission at Columbus, Ohio. In 1928 he took his bachelor's degree in civil engineering.

Stuart D. Currier, formerly executive director of the regional planning board of Bergen County, N. J., has been appointed planning director of Dade County, Fla., at Miami.

James E. Higdon recently resigned as civil engineer with the Kansas City, Mo., department of public works to accept re-employment as review engineer with the Federal Works Agency, Bureau of Community Facilities, at Fort

TROJAN

COMBINATION BULLDOZER AND SNOW PLOW
for
International Industrial Wheel Type Tractor



This efficient earth mover can also be used for snow removal. The bulldozer blade and V type or reversible blade snow plows are interchangeable.

The one control valve provides easy operation and the parallel blade lift and full axle clearance are Trojan features. This rugged, thrifty tool has ben designed for use on International I-4, I-6 and I-9 Wheel Tractors.

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Light, comfortable, easy to wear under all job conditions, M.S.A. Skullgards are *strong and tough* for dependable head protection. Exclusively high-pressure molded of laminated bakelite, Skullgards do not soften or deteriorate from exposure to sun, rain, perspiration, oils or common chemicals—the millions being worn daily prove their top popularity as standard work hats for every job.

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CARVER centrifugal pumps

1 Non-recirculating priming...no recirculation gadgets to plug up.

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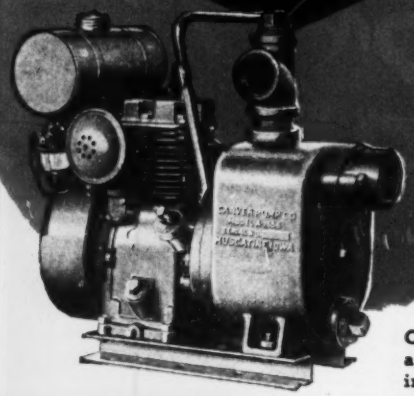
4 Carver pumps lead the field in efficiency.



Carver pumps are offered with a choice of power and mounting in sizes from 1½" to 10".

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CARVER PUMP CO.
Muscatine, Iowa

Worth, Tex. From 1936 to 1944 he was construction engineer with the PWA, the TWA and the War Department, and previous to that he was in highway and municipal engineering.

Early in December **Col. A. M. Neilson,** U.S. district engineer at Cincinnati, Ohio, left for Huntington, W. Va., to assume his duties as district engineer there. **Lt. Col. George N. Kibler** is acting district engineer at Cincinnati.

Donald C. Beam, graduate of Toronto University, and recently general superintendent of Construction Wartime Housing, Ltd., has been appointed chief engineer, Carter Construction Co., Ltd., Toronto, Ont.

Col. James E. Harper, Jr., formerly with the U.S. Engineers at Vicksburg, Miss., has been transferred to Memphis, Tenn., as assistant to Col. B. M. Harloe, district engineer. **Maj. T. B. Hunter,** former civilian employee of the Mississippi River Commission, has left the U.S. Waterways Experiment station at Vicksburg, and having been commissioned in the regular Army, is going to the Pacific theater.

J. M. Reilly has been appointed cost engineer with the Pacific Islands Engineers of San Francisco on their contract with the Navy Department at Guam. In recent years he has been employed in the Puget Sound area, chiefly with Bebb-Jones Bouillon and Sylliaasen, consulting engineers and architects, Seattle, Wash. Among the projects under his supervision were the Lake Washington shipyard, Seattle Port of Embarkation, sub port facilities installations at Prince Rupert, B.C., Naval Ordnance Base Depot, Tacoma, and certain phases of the Navy railroad location between Shelton and Bremerton. More recently he was associated with S. R. Gray & Sons of Puyallup, Wash.

Concerning the work as Guam, Mr. Reilly writes: "This project, so far in the preliminary stage, is of considerable magnitude, the extent not yet determined. Our immediate program is chiefly the planning of permanent housing facilities for the service personnel. Community areas for the native population are being planned with sewerage, light, water and roads to the residential districts, mercantile and recreational facilities, and administration quarters for the various areas. The Guam governmental buildings together with libraries, educational, health and kindred services are also on the program. The island was practically denuded during Japanese occupancy. Our force now consists of about 180 engineers, field and office, under the direction of ex-Col. W. F. Way of Seattle."

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3 TYPES DESIGNED FOR EVERY DIGGING CONDITION

LS . . . A lighter weight bucket designed for levee and drainage work.

TS . . . A medium weight bucket, classified as a general purpose bucket.

HS . . . A heavy duty bucket for moving shale or any hard formation.

3/8 to 30 Cubic Yds.

HENDRIX *Lightweight* **DRAGLINE BUCKETS**

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You automatically step up the YARDAGE of your dragline by hooking up a Hendrix Lightweight Bucket! It's 20% to 40% lighter than other buckets, type for type! Can be used on a machine designed for small operations and still maintain the allowable loaded weight. You'll get bigger payloads on operations requiring a long boom, and in wet digging you'll increase your payloads by leaving the water in the pit. We took the load ***out of the bucket***... to let you put it ***inside!***

- ★ 20% to 40% lighter than other buckets, type for type.
- ★ All welded construction for greater strength and durability.
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- ★ Full Pay Load every trip, even in wet diggings.
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ELSIE EAVES, Manager J. A. MAHONEY, Reports J. V. McEWEN, M. R. ROESSLER, Statistics

WATER SUPPLY

PROPOSED WORK

Ark., Dierks—City, H. M. Griffin, mayor, WW. **$100,000.** Marion L. Crist & Assoc., Union Life Bldg., Little Rock, consult engrs.

Calif., Arcata—City, City Hall, defeated bonds water sys. imprvs. **$250,000.** CD 11/13—ENR 11/28.

Calif., San Lorenzo Valley (Ben Lomond Boulder Creek and Brookdale)—San Lorenzo Valley Co. Water Dist., Firehouse, Boulder Creek, defeated bonds. water sys. imprvs., incl. mains, reservoirs, etc. **$500,000.** CD 11/20—ENR 12/12.

Fla., St. Augustine—St. Johns Co., water distr. sys. extens., imprvs. **$266,630.**

Ga., Jackson—Pepperton Cotton Mills, Jackson, deepwell and water sys. **$150,000.** Financing provided.

Ind., Evansville—Water Works Dpt., E. C. Henning, chn., City Hall, preliminary plans WW imprvs., water distr. sys. for East End, 15,000 ft. watermains, and 500,000 gal. elevated steel tank. **$250,000.** Boyd E. Phelps, Inc., 622½ Franklin St., Michigan City, consult. engr.

Ia., Grinnell—City, elevated water tanks and 2 reservoirs. **$110,000.** Financing not provided.

Ia., Mystic—City, WW. **$155,000.** R. W. Gearhart, 349 21 St. S. E., Cedar Rapids, consult. engr.

Kan., Arkansas City—City, water sys. imprvs. **$100,000.** Financing not provided. Wayne Lambert, city engr. CD 8/9—ENR 8/23

★**Ky., Henderson**—Bd. P. Wks., R. B. Posey, chn., City Hall, WW sys. **$1,929,006.** Black & Veatch, 4607 Broadway, Kansas City, Mo., consult. engrs.

Me., Boothbay—Town, public water supply at East Boothbay Village, Proj. 1-17-P-50. Coffin & Richardson Inc., 68 Devonshire St., Boston 9, Mass., consult. engr.

Md., North Beach—City, water sys., incl. wells, storage tank. **$113,735.**

★**Mich., Monroe**—City, A. J. Jennings, city water dir., Monroe, water supply imprvs., incl. intake water line exten. more than 10 mi. into Lake Erie, **$750,000;** electrifying present water filtration plant, erecting storage tank and chemical and settling basin bldg., over **$250,000.** Financing provided. Shoecraft, Drury & McNamee, Ann Arbor, Mich., consult. engrs. CD 11/21/44—ENR 12/14/44.

Mo., Poplar Bluff — City, voted **$250,000** bonds, WW extens., imprvs. and municipal light and power plant.

N. J., Lincoln Park—Lincoln Park Boro, water sys., Proj. 1-28-P-327. **$215,000.**

N. Y., Ellenville—Village, water standpipe, 1 mi. 8 in. line, 3 mi. 6 in. watermains, changes and addns., Proj. 1-30-P-97. **$154,560.** Bowe, Albertson & Assoc., 110 William St., New York, Zone 7, consult. engrs. (**Correction,** name of engineers). CD 11/18—ENR 11/28.

N. Y., Guilderland—Town, Earle B. Conklin, supt., 14 Norwood St., McKownville, water sys., Proj. 1-30-P-115. **$194,000.** Benjamin L. Smith & Assoc., 11 N. Pearl St., Albany, consult. engrs.

N. Y., Fort Edward—Town, water distr. sys., Proj. 1-30-P-114. **$139,900.** McFarland & Brown, Box 414, Glens Falls, consult. engrs. CD 8/4/44—ENR 8/24/44.

N. Y., Liberty—Town, exten. Stevensville Water Dist.. **$152,500.**

N. Y., Livingston Manor—Water Dist., Livingston, imprv. water sys. **$100,000.**

N. Y., North Castle—Town, imprv. water sys. **$148,750.**

N. Y., Somerset—Town, water supply sys. **$300,000.**

N. C., Mount Airy—Town, F. Carter, mayor, voted bonds imprv. water sys. **$140,000.** CD 11/18—ENR 11/28.

N. C., Spray—Spray Sanitary dist., c/o C. P. Wall, Leaksville, water distr. sys., **$329,000.** William C. Olsen, 5 Exchange Pl., Raleigh, consult. engr. CD 12/3—ENR 12/22.

Okla., Sapulpa—City, plans completed 12 in. water supply main to bring water from Tulsa to Sapulpa. **$250,000.** Financing not provided. J. J. Burroughs, City Hall, engr.

★**Pa., Chester**—Chester Municipal Auth., 5 and Welsh Sts., plans under way dam, **$9,000,000;** water lines, appurtenances, over **$40,000.** Financing provided, surveys pump. station, over **$50,000.** Albright & Friel, Inc., 1520 Locust St., Phila., consult. engr. CD 4/1—ENR 4/18.

Tex., Ballinger — City, K. V. Northington, secy., 1 m. g. p. d. c. water treatment plant, **$200,000;** 8,300 ft. 6- to 10-in. c. i. distr. lines, **$30,000;** 25,000 lin. ft. 12 in. c. i. water supply line, **$100,000.** Financing provided. Parkhill, Smith & Cooper, 210 Sanford Bldg., consult. engrs.

Tex., Bellaire—City, Abe Zindler, mayor, WW sys. imprv. **$100,000.** Financing not provided. J. B. Dannenbaum, Bellaire, engr. CD 10/9—ENR 10/31.

Tex., Houston—Harris Co. W.C. & I.D. 10, W. H. Voswinkle, pres., 4300 Castor Dr., WW extens. **$183,868.** Garrett Eng. Co., 1806 Milam St., consult. engr.

Tex., Marshall—City, voted bonds, water storage, **$350,000;** water supply, **$325,000;** c. i. pipelines, **$275,000.** Financing provided. CD 3/7—ENR 3/21.

Tex., Port Arthur—Jefferson Co. Water Control & Imprvt. Dist. 6, c/o Mark L. Jefferson, Port Arthur, plans under way, water supply, storage, pumping, approx. **$50,000;** c. i. water lines, approx. **$75,000,** in Port Acres, J. J. Rady, Insurance Bldg., Fort Worth, consult. engr. Bonds voted. CD 2/28—ENR 3/21.

Wis., Prairie du Chien—City, WW. imprvs., incl. 2 m. g. rein.-con. reservoir, pumps, etc. **$132,647.** Cullen & Bartels, Stampfer Bldg., Dubuque, Ia., consult. engrs. CD 11/25—ENR 11/28.

B. C., Kelowna—City, reservoir, renewing reservoir main, replacing intake main, increasing pumping capacity. **$110,000.**

B. C., Smithers—Town, WW sys. **$100,000.** Dutcher & Brockington, 1379 Devonshire Crescent, Vancouver, engrs. CD 8/8—ENR 8/22.

Ont., Port Burwell—Municipality, water sys. **$120,000.** Rate payers voted in favor.

SEWERS, WASTE DISPOSAL

PROPOSED WORK

Ark., Dierks—City, H. M. Griffin, mayor, sewerage sys. **$115,000.** Marion L. Crist & Assoc., Union Life Bldg., Little Rock, consult. engrs.

Calif., Benicia—City, City Hall, sewage disposal treatment plant. **$346,500.** Solano Engineers, Inc., J. R. Burnham, pres., Suisun, consult. engrs.

Calif., Pacific Grove—City, City Hall, sewage disposal plant. Over **$60,000.** H. N. Jenks, 345 Madrono Ave., Palo Alto, consult. engr. CD 3/12/45—ENR 3/22/45.

Calif., Red Bluff—City, City Hall, sewage disposal plant. **$150,000.** C. C. Kennedy, 604 Mission St., San Francisco, consult. engr.

Calif., Romano—Romano Sanitation Dist., Romano, sanitary sewerage sys., trunk sewer and sewage treatment plant. **$150,460.** Byrl D. Phelps, 435 Union Bldg., San Diego, consult. engr. CD 11/21.

★**Calif., San Francisco**—Dpt. P. Wks., City Hall, plans by W. Clement Ambrose & Eldridge T. Spencer, 251 Kearny St., North Point Sewage Disposal Plant. **$5,500,000.** Metcalf & Eddy, Statler Bldg., Boston, Mass., and C. C. Kennedy, 604 Mission St., San Francisco, consult. engrs. R. Wadsworth, City Hall, city engr. CD 2/21/45—ENR 3/8/45.

Conn., Branford—Town, sanitary sewerage sys., Proj. 1-6-P-57. **$582,530.** Argraves & Mort, 70 College St. New Haven, consult. engrs.

Conn., Stratford—Town, H. B. Flood, mgr., sewers, Paradise Green Sect., incl. trunk lines Wilcoxson Ave. and Brewster St.; lateral sewers, Birch and Beers Pl., Brewster Sheppard and Plymouth Sts., Allyndale and Lobell Drs., Brightwood, Hurd, Longbrook Aves., Inwood Rd. **$75,000.** Bowe Albertson & Assoc., 110 William St., New York 7, N. Y., consult. engrs. CD 10/2/45—ENR 10/11/45.

Del., Lewes — Town, Lewes, plans under way, storm sewers, **$114,000;** sewage treatment plant, **$296,000;** surveys sanitary sewers, over **$40,000.** Financing provided. Clarke Gardner & Assoc., Salisbury, Md., consult. engrs. CD 11/29—ENR 12/21.

Ill., Dieterich—Village, Village Hall, plans completed, sewerage sys. and sewage treatment plant. **$145,000.** Financing provided. Marbry & Johnson, Robinson, consult. engrs. CD 1/30—ENR 2/21.

★**Ill., East St. Louis**—East Side Levee and Sanitary Dist., relief trunk sewerage sys. **$3,175,000.**

Ill., Elgin—Elgin Sanitary Dist., Elgin, sanitary sewer extens., exten. main interceptor **$129,000,** V. Kasler, city engr., Elgin, engr.; sewerage treatment plant addns.. imprvs., **$121,000,** Greeley & Hansen, 220 S. State St., Chicago, consult. engrs. CD 11/13—ENR 11/28.

Ill., Nokomis—City, City Hall, plans completed sanitary sewer extens. and sewage treatment plant. **$128,000.** Financing provided. McCaslin & Ratchford, Nokomis, consult. engrs. CD 11/21/45—ENR 12/13/45.

Ill., West Frankfort—City, J. C. Randolph, mayor, plans under way, sanitary sewerage imprvs., extens. **$332,600.** Ellaby, Hurst & Rosche, Hillsboro, engrs.

Ill., Wamac—City, City Hall, plans completed sanitary sewerage sys. and sewage treatment plant. **$100,000.** Financing provided. McCaslin & Ratchford, Nokomis, consult. engrs. CD 6/14—ENR 6/27.

Ind., Ft. Wayne—City, Bd. P. Wks., addnl. storm sewer in Lafayette St. Sect., **$779,385** and Brackenridge Sect. **$161,675.** CD 8/3/45—ENR 8/9/45.

Ia., Mystic—City, sewerage. **$133,500.** Financing not provided. R. W. Gearhart, 349 21 St. S. E., Cedar Rapids, consult. engr.

Ky., LaGrange—Oldham Co., sanitary sewerage sys., incl. disposal plant. **$174,504.**

Ky., London—Laurel Co., sanitary sewer extens., sewage disposal plant. **$139,153.**

La., White Castle—City, L. A. Papet, clk., sewerage sys. **$100,000.** Earl Porter, 1955 Chestnut St., Baton Rouge, consult. engrs.

Md., North Beach—City, sewerage sys., incl. pump. station, treatment plant. **$123,965.**

Mich., Centreville—St. Joseph Co., sanitary sewerage sys., disposal plant. **$141,500.**

★**Mich., Saginaw**—City, sewage and garbage disposal plant, lateral and trunk sewers, **$4,417,000.** Francis Eng. Co., 201 Eddy Bldg., consult. engr. CD 11/13—ENR 11/28.

Miss., Holly Springs—City, c/o mayor, plans under way exten. sanitary sewerage sys. **$145,000.** Allen & Hoshall, 65 McCall Pl., Memphis, Tenn., consult. engrs. CD 12/5.

Mo., Joplin—City, M. E. Fones, clk., voted **$1,275,000** bonds, sewage disposal plants, sanitary sewer extens., garbage and trash disposal, street right of way. C. A. Haskins, 517 Finance Bldg., Kansas City, Mo., consult. engr. CD 11/25—ENR 12/12.

Neb., Plattsmouth—City, sewerage sys. **$165,840.** Financing not provided. Douglas McKnight, 1819 S. 23 St., Lincoln, consult. engr.

N. J., Brigantine — City, surveys, sewers, **$40,000.** Financing not provided. Lester Kieger, Brigantine, consult. engr.

N. J., Trenton—Ewing Twp. Comn., Pennington Rd., plans under way incinerator plant, over **$55,000.** Financing provided. Micklewright & Mountford, 242 E. Hanover St., consult. engrs. and archts.; surveys sewers, over **$50,000.** Financing not provided, both projects in Ewing Twp.

★**N. Y., Albany**—City, sewage treatment plant at Westerloo Island, Proj. 1-30-P-124. **$1,660,000.** Parsons, Brinkerhoff, Hogan & MacDonald, 142 Maiden Lane, New York, consult. engrs.

N. Y., Bolton—Town, sanitary sewerage sys. and sewage disposal plant, Proj. 1-30-P-113. **$271,280.** McFarland & Brown, Box 414, Glens Falls, consult. engrs.

N. Y., Canton—Dpt. P. Wks., Albany, plans under way, sewerage sys. at State Agricultural & Technical Institute at St. Lawrence University, for Dpt. Educ. **$205,000.**

N. Y., Ellenville—Village, 13 mi. sanitary sewers and sewage treatment plant. **$504,000.** Bowe, Albertson & Assoc., 110 William St., New York, Zone 7, consult. engrs. (**Correction** —name of engineers). CD 11/18—ENR 11/28.

N. Y., Fallsburg—Town, sanitary sewers, pump. station and sewage treatment plant, at Hamlet of Woodburne, Proj. 1-30-P-117, **$266,000;** sanitary sewers and treatment plant at Hamlet of Hurleyville, Proj. 1-30-P-118, **$266,000;** at Hamlet of Mountaindale, Proj. 1-30-P-119, **$165,000.** Alexander Potter Associates, 50 Church St., New York, Zone 7, consult. engrs.

N. Y., Fort Edward—Town, sanitary sewerage sys., Proj. 1-30-P-116. **$125,225.** McFarland & Brown, P.O. Box 414, Glens Falls, consult. engrs. CD 8/4/44—ENR 8/24/44.

N. Y., Ithaca—Town, sewerage sys. and treatment plant. **$400,000.** CD 8/25/44—ENR 9/7/44.

N. Y., Kings Park—Dpt. P. Wks., Albany, plans under way, replacing brick storm sewer at Kings Park State Hospital for Mental Hygiene Dpt. **$180,000.**

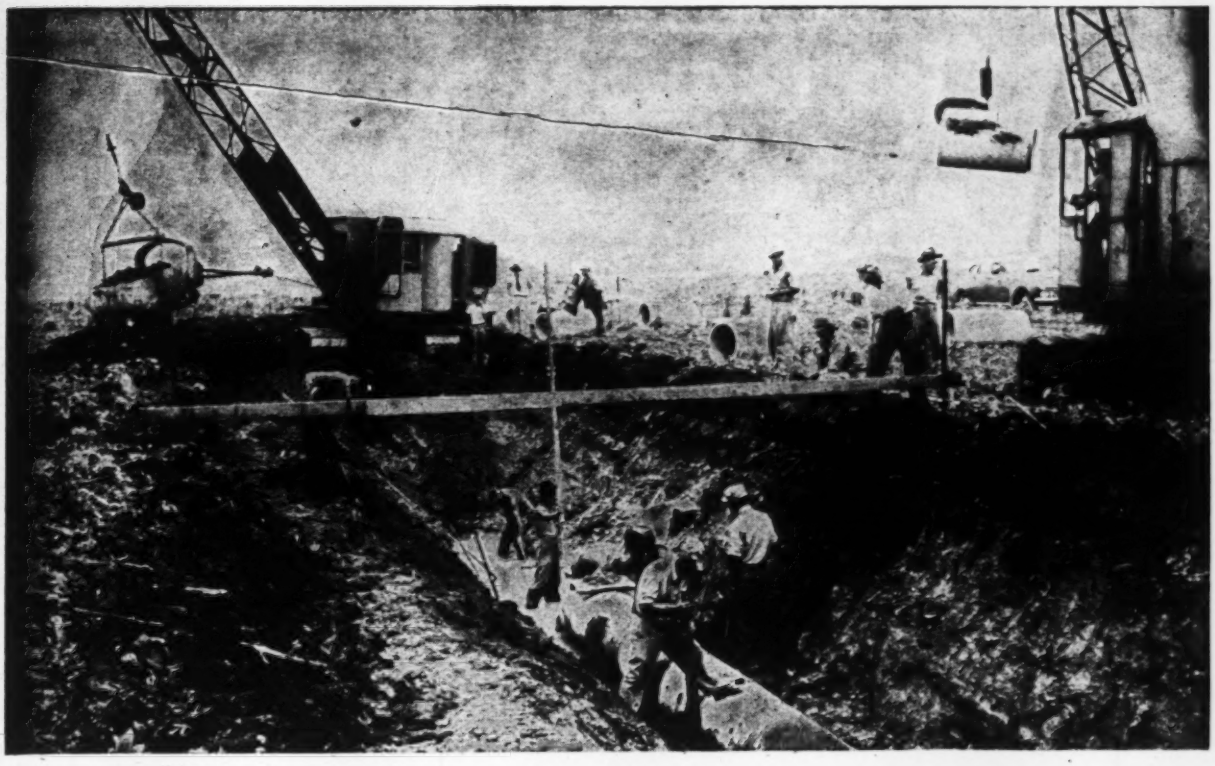
N. Y., Liberty—Town, sewerage sys. and treatment plant. **$167,150.**

★**N. C., Raleigh**—City, sanitary sewer outfall and collection main, **$175,000;** two 3 m.g.d.c. sewage treatment plants, **$644,000** each. CD 11/24/43—ENR 12/2/43.

N. C., Spray—Spray Sanitary Dist., c/o C. P. Wall, Leaksville, exten. sanitary sewerage sys. **$570,000.** William C. Olsen, 5 Exchange Pl., Raleigh, consult. engr. CD 12/3—ENR 12/12.

O. Maumee—Village, sewage treatment plant, **$342,000,** three storm sewer projects, **$253,800;** sanitary sewers, **$40,000.** Finkbeiner, Pettis & Strout, Home Bank Bldg., Toledo, consult. engrs. CD 12/5.

O., Perrysburg—Village, primary treatment plant, 500,000 gal. daily capacity intercepting sewers along Maumee River to channel present outlets back to plant. **$250,000.** Financing not provided. Finkbeiner, Pettis & Strout, Home Bank Bldg., Toledo, consult. engrs. CD 12/12.



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SEWERS (Proposed Work, Cont'd.)

O., Recovery—City, sanitary sewerage sys., incl. primary and secondary treatment plant. **$252,828.**

O., South Zanesville—City, sanitary sewerage sys., incl. primary treatment plant. **$158,000.**

Pa., Charleroi — Charleroi Boro, sewage treatment plant, sewage facilities. **$300,000.** Financing provided. Capitol Eng. Corp., Dillsburg, consult. engr.

★**Pa., Williamsport**—City, sewerage sys. addns., incl. lift stations. **$1,425,000.**

Tex., Angleton—City, Carlos B. Masterson, mayor, storm sewers. **$157,400.** S. A. Russell, P.O. Box 150, Bay City, consult. engr.

Tex., Groves—Jefferson Co. W. C. & I. D. 1, J. V. Pinder, Jr., pres., sewer lines and treatment plant. **$220,000.** J. B. Converse & Co., Inc., Port Arthur, consult. engrs.

Tex., Houston—Harris Co. W.C. & I.D. 9, J. K. Revell, pres., 8141 Barkley Dr., sewage disposal plant, **$112,500;** sewer and water line extens., **$162,000.** Frank J. Metyko, 604 Scanlan Bldg., consult. engr.

Tex., Port Arthur—Jefferson Co. Water Control & Imprvt. Dist. 6, c/o Mark R. Jefferson, Port Arthur, plans under way, sanitary sewers, approx. **$70,000;** storm sewers, approx. **$55,000.** Bonds voted. J. J. Rady, Insurance Bldg., Fort Worth, consult. engr. CD 3/18—ENR 4/4.

Utah, Ephraim—Town, c/o L. C. Anderson, mayor, approx. 51,900 lin. ft. 4- to 15-in. sanitary sewer lines, sewage treatment plant. **$170,000.** Caldwell & Richards, Templeton Bldg., Salt Lake City, consult. engr. CD 11/25—ENR 12/12.

Utah, Gunnison—Town, L. P. Allen, mayor, approx. 39,000 lin. ft. 4- to 12-in. sanitary sewers, sewage treatment plant. **$107,000.** Caldwell & Richards, Templeton Bldg., Salt Lake City, consult. engrs. CD 11/25—ENR 12/12.

Va., Portsmouth—City, storm sewers, concrete curbs and gutters. **$601,900.**

Wash., White Salmon—Town, Town Hall, treatment plant and sewerage sys. **$105,000.** Financing not provided. Parker & Hill, Smith Tower, 2 Ave. and Yesler Way, Seattle, Zone 4, consult. engrs. CD 11/8/45—ENR 11/29/45.

W. Va., Moundsville—City, primary sewage treatment plant and combination garbage and sewage sludge incinerator. **$511,000.**

★**W. Va., Wheeling**—City, primary sewage treatment plant. **$1,125,200.** CD 11/22—ENR 12/12.

Ont., Brantford—City, sewage disposal plant. About **$590,000.** G. H. Richards, c/o owner, and Gore & Storrie, 1130 Bay St., Toronto, engrs.

Ont., Peterborough—Municipality, sewage disposal plant **$375,000.** Rate payers voted in favor.

BRIDGES

PROPOSED WORK

Arkansas — State Hy. Dpt., Little Rock, bridge across St. Francis River at Parkin, **$306,000;** overpass over Rock Island R. R. track at Ola, **$82,000.** W. W. Zass, Little Rock, engr.

★**California**—State Div. Hys., Sacramento, 0.6 mi. bridges, approaches at Rock Creek, **$184,000;** 0.7 mi. at Navarro River, **$360,000;** 12 mi. at Salmon Creek, **$690,000;** 0.6 mi. St. Ores Creek, **$88,000;** 0.7 mi. Kibbesillah Creek, **$88,000,** all foregoing Mendocino Co.; 0.1 mi. South Fork of Pit River, Modoc Co., **$55,000;** 0.6 mi. Sacramento River near Butte City, Glenn Co., **$270,000;** 0.1 mi. Tuolumne River (Stevens Bar), Tuolumne Co., **$118,000.** G. T. McCoy, P. Wks. Bldg., Sacramento, state hy. engr. CD 12/3/43—ENR 12/9/43.

★**Illinois**—Du page Co., separation of highway and railroad grades. **$7,160,000.**

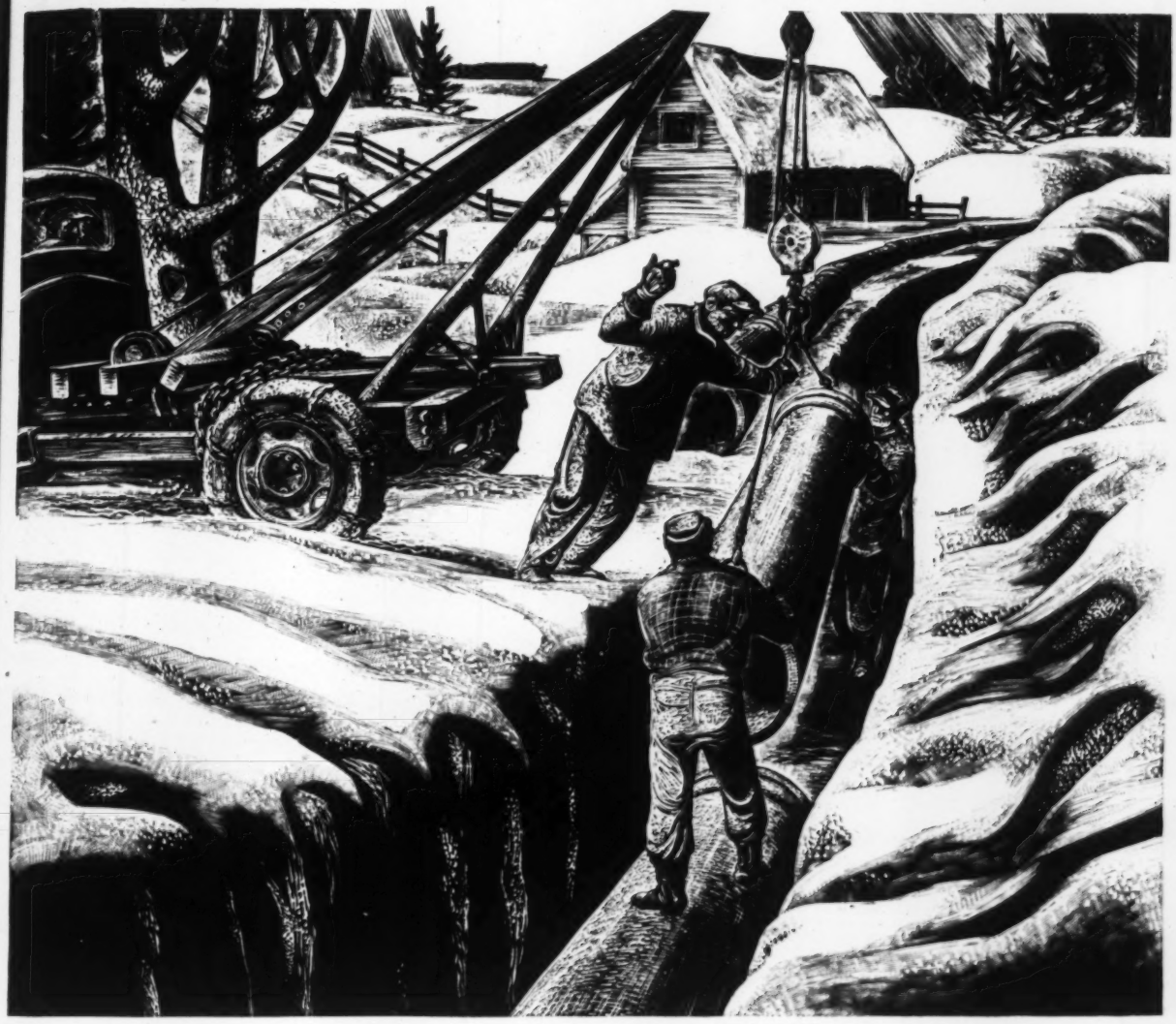
★**N. J., Cape May Court House**—Cape May Co. Bridge Comn., plans under way toll bridge, in Strathmere, **$1,000,000;** paving, grading, etc. same bridge, **$50,000.** Financing provided.

N. J., Mays Landing—Bd. Freeholders, Atlantic Co., Mays Landing, bridges, overpasses and underpasses. Over **$100,000.** Financing not provided. A. H. Nelson, North Carolina and Atlantic Aves., Atlantic City, consult. engr. CD 12/20/45—ENR 1/10/46.

N. Y., Buffalo—City, reconstructing steel viaduct carrying South Park Ave. over tracks of Erie and New York Central Railroads, Proj. 1-30-P-110. **$226,000.** A. Stuart Collins, 232 Delaware Ave., consult. engr.

O., Bentleyville—Bd. Comrs. Cuyahoga Co., F. J. Husak, clk., New Court House, Cleveland, repairing, rebuilding Bentleyville Bridge over Chagrin River, in Miles Rd. **$300,000.** John O. McWilliams, Standard Bank Bldg., Cleveland, co. engr.

O., Cleveland—Bd. Comrs. Cuyahoga Co., F. J. Husak, clk., New Court House, repairing Detroit, Superior High Level Bridge, **$300,000;** constructing bridge across Metropolitan Park connecting Willson Mills Rd. exten. and Green Rd., **$850,000;** replacing Biddulph Rd. Bridge over Countryman's Creek. **$120,000.** John O. McWilliams, Standard Bank Bldg., co. engr. CD 12/10/43—ENR 12/16/43.



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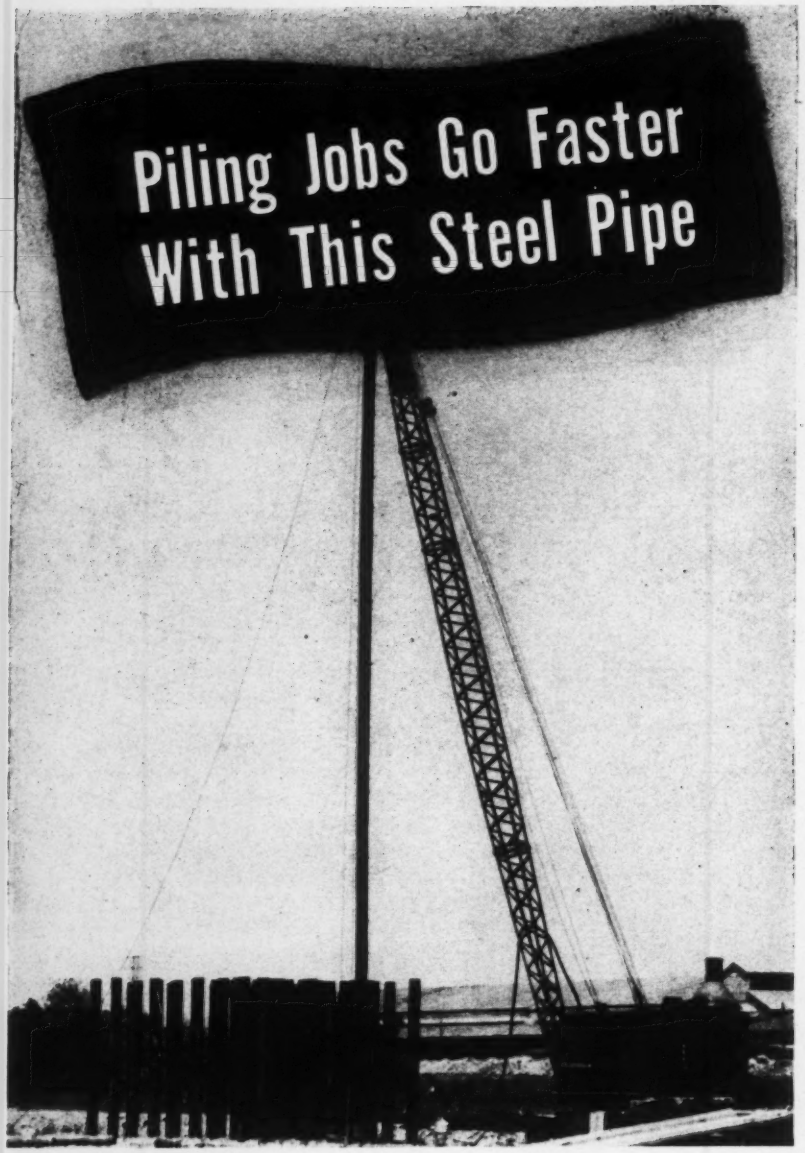

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BRIDGES (Proposed Work, Cont'd.)

Pa., Pittsburgh—Baltimore & Ohio R. R. Co., A. C. Clark, ch. engr., Baltimore and Charles Sts. Baltimore, Md., 3 span steel girder bridge on 2 rein.-con. abutments and 2 rein.-con. piers carrying railroad tracks over Hazlewood Ave. **$120,000.**

Tex., Dallas—City, overpass, on Lamar St. new location. **$245,000.** Financing provided. Powell & Powell, Republic Bank Bldg., consult. engrs.

Ont., Peterborough — Municipality, grade crossing elimination. **$150,000.** A. C. Chambers, City Hall, engr.

STREETS AND ROADS

PROPOSED WORK

★**Arkansas** — State Hy. Dpt., Little Rock, grading, draining, surfacing State 8 east from Mena, Polk Co., **$300,000**; 12 mi. State 1, McGehee to Rohwer, Desha Co., **$300,000**; 15 mi. State 25, Heber Springs to Quitman, Cleburne Co., **$203,500**; constructing 12 mi. Camden-Stephens Rd., Ouachita Co., **$512,000**; 15 mi. road from St. Francis River to Hughes, St. Francis Co., **$612,000**; 15 mi. road between Williford and Hardy, Sharp Co., **$406,000**; 9 mi. road from Eudora to Louisiana State Line,* Chicot Co., **$200,000**; connection at Springdale with Hy. 68, Washington Co., **$52,500**; grading, graveling 9 mi. State 109, south from Paris, Logan Co. **$52,000**; road work 8 mi. U. S. 79 west from Marianna, Lee Co., **$200,000**; basing, surfacing 10 mi. State 14, Newport to Amagon, Jackson Co., **$60,000.** W. W. Zass, Little Rock, engr.

Ark., Crawfordsville—City, c/o mayor, City Hall, paving various streets in Dist. 1, **$44,200**; rehabilitating sidewalks and storm sewers, resurfacing brick pavement, constructing concrete slab or asphaltic concrete base on various streets, **$175,354.** Dickinson & White, 115 N. Spring St., Little Rock, consult. engrs. CD 11/13—ENR 11/28.

†**California**—Pub. Rds. Admin., 720 Phelan Bldg., San Francisco, grading 4.6 mi. Big Bear-Hayfork Rd. from 4.7 mi north of Hayfork northerly, Proj. 4N09-B; 5 mi. Harker Creek Rd., from Hayford Valley north, Proj. 3N05; grading and bridge 3.6 mi. Tule Creek-Butter Creek Rd. from Hayfork west, Proj. 2N13-D; graveling 17.7 mi. Tule Creek-Butter Creek Rd. from Hayfork to Oak Ridge, Proj. 2N13-a, B, C, D. C. C. Morris, Phelan Bldg., San Francisco, div. engr.

★**California**—State Div. Hys., Sacramento, grading, paving, structures 3.1 mi. from Roseville to 2 mi. north of Andora Subway, Placer Co., **$1,462,000**; 7.7 mi. from Rob Roy to Morrissey Ave. in Santa Cruz, Santa Cruz Co., **$2,428,000**; 1.8 mi. from north city limits of South San Francisco to Colma Creek, San Mateo Co., **$759,000**; 4.7 mi. from South County Boundary to Selma, Fresno Co., **$550,000**; 5.3 mi. from Vallejo Wye to north of junction of Route 208, Solano Co., **$881,000**; grading, surfacing structures 6.7 mi. from 1.6 mi. north of Forsythe Creek Bridge to Ridgewood Summit, Mendocino Co., **$1,914,000**; 0.5 mi. from 0.5 mi. north of Route 65 to Route 65, **$183,000**; 1.8 mi. south of Jackson to east of Jackson, **$270,000**, both Amador Co.; grading, paving 0.3 mi. south of county line to county line, Tulare Co., **$62,000**; grading, surfacing 4 mi. from Willow Creek to crossing of Trinity River, Humbolt and Trinity Counties, **$224,000**; 4 mi. from Route 28 to Oregon state line, Modoc Co., **$230,000**, 7.8 mi. from Camp Lowe to Bailey Hills, Siskiyou Co., **$913,000.** G. T. McCoy, P. Wks. Bldg., Sacramento, state hy. engr. CD 12/3/43—ENR 12/9/43.

Ill., Danville—City, City Hall, Imprv. 4,600 ft. Bowman Ave. from Main to Fairchild Sts. **$30,000**; 1,300 ft. Jackson St. from Fairchild to English St., **$10,000**; 2,600 ft. Bowman Ave. from Fairchild St. to city limits, **$15,000**; 1,400 ft. Roselawn Ave. from Vermilion to Gilbert Sts. **$12,000**; 3,800 ft. Williams St. from Vermilion to Collett Sts. **$33,000**; 2,500 ft. North St. from Washington to Collett Sts., and 500 ft. Collett St. from North to Main Sts. **$25,000.** F. A. Roseman, City Hall, Danville, city engr.

Missouri—State Hy. Dpt., Jefferson City, plans 90% completed grading, surfacing 2.75 mi. Route N, road from Route N to Commerce Rd., **$18,600**; 0.152 mi. Route ZZ road from Route 61 to Tanner, Scott Co., **$16,300**; 3.2 mi. Route J, road from Deering to Braggadocia, **$40,000**, 2.515 mi. Route N, road from Route C to Dunklin Co. line **$33,600** both Pemiscot Co.; 13.74 mi. Route T, road from Route 72 to Route 68, **$46,000**, 0.114 mi. Route G, road from Route 72 south, **$15,000**, both Phelps Co.; 2.506 mi. Route C, road to Louisburg to Polk Co. line, Dallas Co. **$14,800**; 1.851 mi. Route B, road from Worthview southeast, **$20,000**, 0.214 mi. Route E, road from Route 60 to Christian Co. line, **$17,000**, both Webster Co.; 2.463 mi. Route M, road from Route C south, Oregon Co., **$22,200**; 0.133 mi. Route AA, road from Route 55 to Wolf Island, **$11,000**, 5 mi. Route K, road from Texas Co. line northeast, **$40,000**, 9. mi. Route AA road from Round Spring northeast, **$49,500**, both Shannon Co.; 0.25 mi. Route B, road from Oakland to Lyons, **$27,900**, 2.304 mi. Route Y, road from Peace Hill to Route 5, **$23,000**, both Laclede Co.; 3.4 mi. Route T, road from Conran to Portageville, New Madrid Co., **$14,000**, 3.842 mi. Route D, road from Route E west, **$105,200**, 4. mi. Route K, road from Route 21, northeast, Reynolds Co., **$20,000** 2.443 mi.

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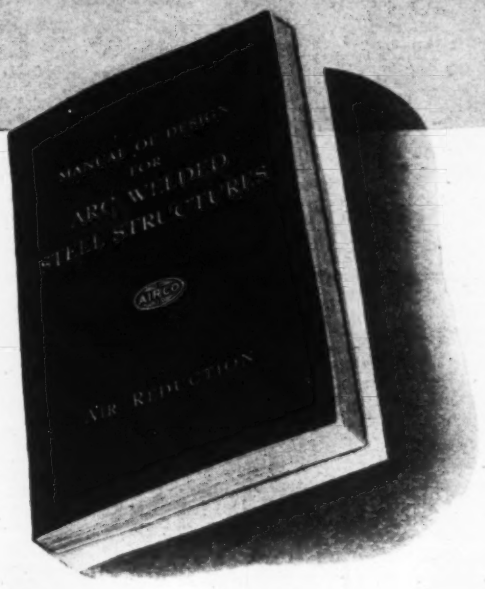

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STREETS, ETC. (Proposed Work, Cont'd.)

Route T, road from Route 32 to Route E, Dent Co., **$33,800**; 0.095 mi. Route C, road from Forsythe to Ozark Co. line, Taney Co., **$13,000**; 2.71 mi. Route AA road from Morocco to Route 51, Butler Co. **$35,000**; 2.462 mi. Route N, road from Route Y to county line, Dunklin Co.; **$39,000**; 5.024 mi. Route K, road from Route 63, southwest, Howell Co.; **$34,500**; 2.795 mi. Route J, road from Route 80 to Arkansas Line, Ozark Co.; **$25,250**; 3 mi. Route N, road from Route A (32) north, Texas Co.; **$21,500**; 0.17 mi. Route J, road from Castor River east and west, Madison Co., **$12,000**; 3.19 mi. Route B, road from Route 61 to Scopus, Ballinger Co.; **$26,000** grading, culvert, surfacing, 7 mi. Route E, road from Racine to Route 71, **$60,000**, 0.5 mi. Route 86 (B), road from east of Neosho, **$2,500**, 14 mi. Route J, road from Diamond to Wentworth, **$38,800**, all foregoing Newton Co.; 1.591 mi. Route J, road from Amsterdam West, Bates Co., **$17,500**; 4.659 mi. Route B, road from Greenridge northeast, Pettis Co., **$40,000**; 2.272 mi. Route U, road from Route F to Daviess Co., Livingston Co., **$34,000**; 1 mi. Route Z, road from Route H to Barton Co., Jasper Co.; **$6,000**; 2.5 mi. Route Z, road from Pennsboro to Route B, Dade Co., **$28,000**; 7.109 mi. Route E, road from Monegaw Springs to Route A, St. Clair Co.; **$42,000**; 2. mi. Route N, road from Caplinger Mills to Polk Co., Cedar Co.; **$7,500**, 6.5 mi. Route T, road from Route 54 to Swartz, Vernon Co.; **$45,000**, reconditioning 6.35 mi. Route E, road from Alton to Route A, Oregon Co., **$11,100.**

Neb., Papillion—City, street imprvs., **$119,-832.** Financing not provided. Henningson Eng. Co., Standard Oil Bldg., Omaha, engr.

N. J., Brigantine—City, paving. Over **$40,-000.** Financing not provided. Lester Kieger, Brigantine, consult. engr.

N. Y., Thomaston—Village, street imprvs. **$175,000.**

N. C., Mount Airy—Town, F. Carter, Jr., mayor, voted bonds street imprvs. **$265,000.** CD 11/18—ENR 11/28.

Tex., Alvin—City, W. E. Davis, mayor, street paving. **$157,000.** S. A. Russell, P. O. Box 150, Bay City, consult. engr.

Tex., Bellaire—City, Abe Zindler, mayor, street paving. **$150,000.** Financing not provided. J. B. Dannenbaum, Bellaire, consult. engr.

Va., Portsmouth—City, concrete curbs and gutters, installing storm sewers. **$601,900.**

Wash., Kelso—Cowlitz Co., plans under way, relocation of Kalama River Rd. **$125,000.** Financing not provided. CD 7/30/45—ENR 8/9/45.

★**Wis., Milwaukee**—City, widening, paving North and South 44 St. from W. Wisconsin to W. National Aves. **$1,235,000.** J. P. Schwada, c/o owner, consult. engr. CD 12/3/43—ENR 12/9/43.

N. S., Halifax—Municipality, 4½ mi. paving; 20,000 ft. curbing and guttering. **$295,000.** R. M. MacKinnon, City Hall, engr.

Quebec—Province of Quebec, Quebec City, terracing, resurfacing, enlarging 24 mi. road between Richmond and Drummondville. **$100,-000.** Dpt. Rds. Quebec City, engr.

EARTHWORK, WATERWAYS

PROPOSED WORK

Ark., Waterloo — Waterloo Drainage Dist. of Jefferson Co., Waterloo, drainage sys. imprvs. **$164,380.** A. E. Heagler, Pine Bluff, consult. engr. CD 11/25—ENR 12/12.

O., Tiffin—Albert J. Allman, chn. Scioto-Sandusky Conservancy Comn., end polution of Sandusky River, provide flood protection and create reservoirs to provide reserve water supplies.

Wash., Bellingham—Port of Bellingham, Municipal Dock, widening, filling, dredging area inside Pine St. as main approach to municipal dock. **$164,000.** Financing not provided. H. F. Isler, mgr. and ch. engr.

†**Alaska, Nome**—U.S. Eng., Textile Tower, 7 and Olive Sts., Seattle 1, Wash., 2,000 to 2,500 ft. breakwater. **$300,000.** Financing not provided.

B. C., Campbell River—Dominion Govt., Ottawa, Ont., breakwater. **$138,000.** Dpt. P. Wks., Hunter Bldg., Ottawa, Ont., engrs.

★**Ont., Kincardine**—Dpt. P. Wks., Ottawa, harbor works, incl. 1,000x1,000 ft. turning basin, 30 ft. deep, breakwater, etc. About **$1,500,000.** R. Blais, c/o owner, engr. CD 5/31—ENR 6/13.

AIRPORTS & AIRBASES

PROPOSED WORK

Ala., Montgomery—AIRPORT BLDG.—City, c/o City Com., plans by Pearson & Tittle, First National Bank Bldg., administration bldg., at municipal airport. **$280,000.**

Ga., Milledgeville—HANGARS, etc.—Southern Airways, Inc., Municipal Airport, Hapeville, 2 hangars and dormitory. **$300,000.** Financing provided.

Mass., Fall River—AIRPORT—Fall River Airport Comn., Fall River, plans under way, municipal airport, incl. two 3,700x500 ft. landing strips; two 3,500x150 ft. paved runways,

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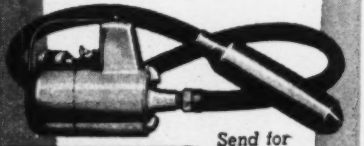

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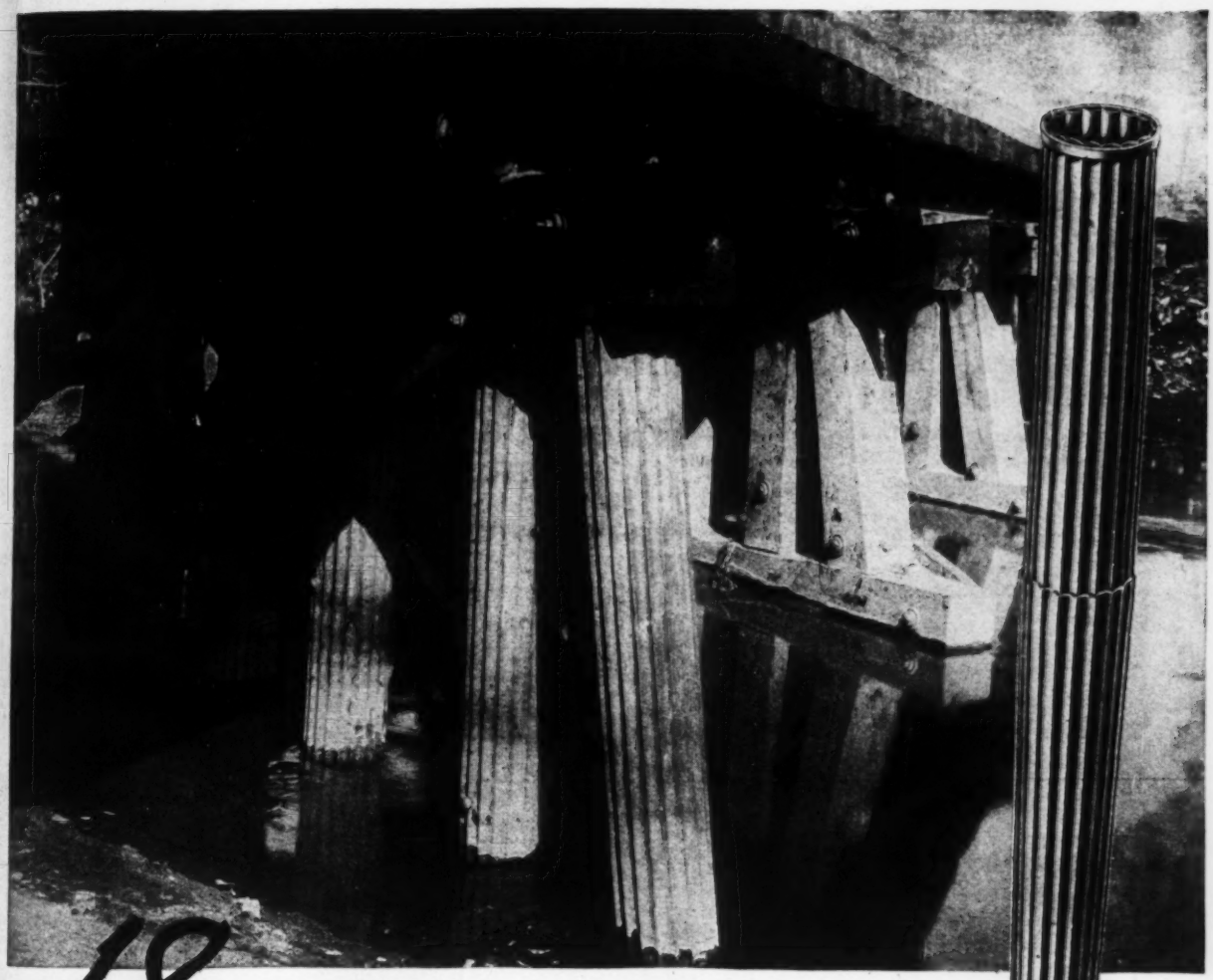

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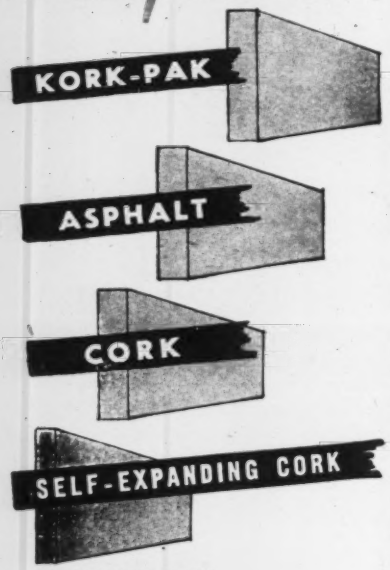

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AIRPORTS, ETC. (Proposed Work, Cont'd.)

etc. **$805,000.** Fay Spofford & Thorndike, 11 Beacon St., Boston 8, consult. engrs. CD 1/2/45—ENR 1/11/45.

N. Y., Ticonderoga—LANDING STRIPS, HANGARS, etc.—Town, imprv., grading, drainage to two emergency landing strips, hangars, administration bldg., etc. **$175,470.** McFarland & Brown, Colvin Bldg., Glens Falls, consult. engr. CD 1/9/45—ENR 2/8/45.

Okla., Idabel—AIRPORT—City, L. Lawson, mayor, runways and ground (dirt) work, **$150,000**; hangars, shop, fueling sys., **$113,000**; access roads, **$50,000.** Paragon Eng. Co., 123 Ogden Lane, San Antonio, Tex., consult. engr. CD 1/12/45—ENR 1/25/45.

S. D., Brookings—AIRPORT—City, plans under way municipal airport. **$200,000.** $165,000 bonds voted. CD 1/15/45—ENR 3/22/45.

★ **Tenn., Chattanooga**—AIRPORT—City, enlarging, imprv. Lovell Field to Class 4 airport. **$3,000,000.** Harwood Beebe Co., Spartanburg, S. C., consult. engr. CD 1/16/45—ENR 3/22/45.

Ont., Peterborough—AIRPORT—Municipality, airport. **$150,000.** Ratepayers voted in favor. A. C. Chambers, City Hall, engr. CD 12/11.

LATIN AMERICA

Argentina, Buenos Aires—Argiro Hnos, San Juan, 3729 plans shoe mfg.-tanning plant. **$150,000.**

Brazil, Rio de Janeiro—National Brazilian Refining Co., Rio de Janeiro, plans oil refinery. **$2,000,000.** Financing provided.

Brazil, Rio de Janeiro—Dr. Salgado Filho & Assoc., Rio de Janeiro, plans oil refinery. **$2,000,000.** Financing provided.

British West Indies — Colonial Govt., St. Lucia, plans 2 mi. road constr. between Dennery and Vieux Fort. **$450,000.** Dpt. Wks., St. Lucia, engr.

B. W. I., Dominica—Colonial Govt., Dominica, plans 8 mi. roadway. **$400,000.** Dpt. Wks., Dominica, engr.

B. W. I., St. Georges—Colonial Govt., St. Georges, plans hotel. **$20,000,000.**

B. W. I., St. Lucia—Colonial Govt., St. Lucia, plans hotel. **$20,000,000.**

B. W. I., St. Lucia—Colonial Govt., St. Lucia, plans harbor dredging. **$200,000.** Dpt. Wks., St. Lucia, engr.

B. W. I., St. Vincent—Colonial Govt., St. Vincent, plans pier constr. **$170,000.** Dpt. Wks., St. Vincent., engr.

Mexico—Mexican Natl. Railway Lines, Mexico City, plans under way railway lines between Puerto Penasco and Benjamin Hill Station, **$1,000,000**; between Ojinaga and Topolobampo, **$1,250,000**; addnl. lines to unite sects. of Yucatan, Campeche and Tabasco, **$3,500,000**; railway line connecting Cocula and Acapulco, **$450,000**; railway line and roadbed imprv. between Durango and Mazatlan, **$500,000**; between Apatzingan and Zihuatanejo, **$350,000**; addnl. Division Railway line from Magozal to Tuxpan on the "shorte route", **$1,500,000.** Financing provided. Eng. Dpt. P. Transportation, Mexico City, engrs. CD 12/6/44—ENR 12/14/44.

Mexico, Chihuahua—Municipal Govt., Arturo Chavez, municipal pres., Palacio Municipal, Ciudad Juarez, plans public market. **$500,000.**

Mexico, Chilapa—Municipal Govt., Palacio Municipal, Chilapa, plans hospital. **$250,000.**

Mexico, Cuernavaca—Latino Americana Life Insurance Co., S. Juan de Letran, Zone 2, Mexico D.F., plans by Manuel de la Colina, Mexico City, apartments on Avenida Morelos. **$400,000.** Luis Rivero del Val, Mexico City, engr.

Mexico, Mexico City—Agua Ideal, S.A. San Luis Potosi, 107, Mexico, D.F., plans water ozonidors factory. **$250,000.**

Mexico, Mexico City—Ancona-Ederer, S.A. Hernando Ancona, mgr., Gante, 4-509 Mexico, D.F., plans plant for linen thread for footwear sewing factory. **$250,000.**

Mexico, Mexico City—Bulmaro Ferrer Carreon y L. la Catolica, 33-407, Mexico, D.F., plans flood gates for hydraulic and irrigation works factory. **$300,000.**

Mexico, Mexico City—Envases Generales Continental of Mexico, S.A., Mexico City, plans by Rafael Hernandez Teran, Mexico City, factory for mfg. tin containers in Avenida Norte 197, Bandojito, Mexico, D.F. **$200,000.**

Mexico, Mexico City—Cia. Industrial Soconusco, S.A., Av. Azcapotzalco, 452, Mexico, D.F., plans cocoa and cocoa butter factory. **$300,000.**

Mexico, Mexico City—Industrias Calbek, S. A., Independencia, 72-407, Mexico, D.F., plans animal hide tannery and treatment plant using Calva process. **$250,000.**

Mexico, Mexico City—Ministry of National Educ., Mexico, Mexico City, bldg. for National School of Economics of National University of Mexico, on Amada Nervo, Naranjo, Rivera de San Cosme and Cipres Sts. Over **$205,000.** Engineering Div. Ministry of National Educ. engrs.

Mexico, Mexico City—Resortes Mecanicos, S.A., Madero, 34, Mexico, D.F., plans mechanical springs factory. **$400,000.**

Mexico, Mexico City—Servicios Aeronauticas de Mexico, S.A., Calle del 57, 21-a, Mexico, D.F., plans airplane factory and repair plant. **$300,000.**

Mexico, Mexico City—Turismo S.A. (Sra. Elena Razo Maciel, mgr.) Reforma, 1-500, Mexico, D.F., plans greyhound race track. **$600,000.**

Mexico, Nuevo Laredo—Municipal Govt., Palacio Municipal, Nuevo Laredo, plans slaughter house. **$250,000.**

Mexico, Tacubaya—Mercury Electric Products, S.A. Primavera, 13, Tacubaya, D.F., plans derivation terminals and connections for high and low tension factory. **$500,000.**

Panama, Panama City—Republic of Panama, Panama City, plans by Ministry of Labor, Social Welfare & Public Health, Panama City, anti-tuberculosis hospital at Chorrera, **$300,000**; exten. Santo Thomas hospital, **$100,000.** CD 4/11/45.

Panama, Panama City—Syndicate, c/o Mayor of Panama City, plans private hospital. **$500,000.**

Panama, Vista Hermosa—Republic of Panama, Panama City, plans by Banco de Urbanizcion y Rehabilitacion, Panama City, 188 addnl. housing units. **$257,000.** CD 4/10—ENR 4/18.

PUBLIC BUILDINGS

PROPOSED WORK

Ala., Bessemer—City, Bd. Educ., Bessemer, plans by D. O. Whilldin, Empire Bldg., Birmingham. Junior High School. **$253,700.** CD 2/1—ENR 5/16.

Ala., Dothan—City Bd. Educ., Dothan, plans by H. L. Holman, Holman Bldg., Ozark, Junior and Senior High School. **$250,000.**

Ala., Luverne—Crenshaw Co. Hospital Assn., c/o B. Lightfoot, chn., Luverne, plans by Sherlock, Smith & Adams, 301 Washington St., Montgomery, 50 bed hospital. **$400,000.**

Ariz., Phoenix—Arizona State Hospital, Tempe Rd., laundry, **$77,250**; male ward, $209,085; female ward, **$209,085**, at State Hospital.

Calif., Gilroy—Gilroy Elementary School Dist., Gilroy, plans by E. J. Kump Co., 251 Kearny St., San Francisco, three 5 room wings at Jordan School, **$350,000.** Bond election in January or February.

Calif., Redding — Shasta, Lassen, Trinity and Siskiyou Counties, c/o Ruth Presleigh, co. clk., Courthouse, Redding, preliminary sketches by E. Geoffrey, Bangs, 605 Market St., San Francisco, 75 bed tuberculosis sanitarium. **$250,000.** CD 11/11—ENR 11/28.

Conn., Bridgeport—City, Bridgeport Housing Auth., 252 Hallett St., 500 to 1000 family apartment houses, Northern Section. Over **$205,000.** Financing not provided.

Conn., Manchester—Bd. Educ., Manchester, brick, steel, school, Woodbridge Dist., **$250,000**; school to replace Bunce School on 15 acre site, Olcott Dist. **$250,000.** Financing not provided.

Conn., Meriden—State, Comptroller, 114 State Capitol, Hartford, plans by Schilling & Goldbecker, 405 Temple St., New Haven, 3 story, bsmnt., 40x195 ft., limestone employees dormitory, State Hospital, Undercliff Sanatorium. **$255,000.** Financing not provided. W. J. Carson, 99 Mountain Rd., West Hartford, consult. engr. CD 8/29—ENR 9/19.

Conn., Newington — State Comptroller, 114 State Capitol, Hartford, plans by Schilling & Goldbecker, 405 Temple St., New Haven, Cedarcrest Sanitorium add., incl. 4 cottages, employees dormitory, boiler house and kitchen. **$305,000.** Financing not provided. W. J. Carson, 99 Mt. Rd., West Hartford, heating, plumbing and electrical engr. C. A. Currier, 967 Farmington Ave., West Hartford, civil engr. CD 8/29—ENR 9/19.

Conn., Newington—Town, Supt. Schools, 1223 Main St., brick, steel school. **$225,000.** Financing not provided.

Conn., Watertown—Town, Supt. Schools, Watertown, plans by C. J. Malmfeldt & Assoc., 36 Pearl St., Hartford, 2 story, bsmt. school, incl. 15 room addn. and gymnasium, Heminway Park. **$300,000.** Financing not provided.

Conn., Winsted—Town, J. W. Darcey, clk., Town Hall, 2 story, bsmnt., brick, steel school. **$225,000.** Financing not provided.

Del., Dover—Delaware State Bd. Educ., Dover, vocation high school. **$275,000.** Financing provided.

Del., Elsmer (Wilmington P. O.)—Oak Grove School Dist., Poplar St., Oak Grove, Wilmington, school. Over **$205,000.** Financing provided.

Fla., Belle Glade—State Imprvt. Comn., c/o C. H. Overman, dir., Tallahassee, plans by Duncan & Duncan, Ocala, prison, at State Farm. **$250,000.** CD 9/5—ENR 9/19.

†**Ga., Americus**—U. S. Eng., 21 St. and Virginia Ave., N.W., Wash. 25, D. C., plans by Burge & Stevens, engrs. and archts., Palmer Bldg., Atlanta, 250 bed tuberculosis hospital for Veterans Admin., Vermont Ave., between H and I Sts. N.W., Wash. 25, D. C. **$450,000.** C. W. Munger, 30 Morningside Dr., New York, N. Y., consult. archt. CD 12/9.

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PUBLIC BLDGS. (Proposed Work, Cont'd.)

Ga., Atlanta—Fulton Co., c/o Courtland Gilbert, planning engr., Courthouse, plans under way, developing negro residential section near Armour Co. Plant. Over **$205,000.**

Ga., Jonesboro—Clayton Bd. Educ., high school incl. classrooms, laboratory, music room, library, lunch room, kitchen and auditorium. **$440,000.**

★**Ill., Belleville**—St. Clair Co., Courthouse, Belleville, preliminary plans by Shaw, Naess & Murphy, 80 E. Jackson St., Chicago, 5 story, Bedford stone courthouse, W. Main St. between Public Sq. and First St. **$2,500,000,** incl. site. CD 8/29—ENR 9/19.

Ill., Fairfield—Fairfield Community High School Dist. 225, plans by Warren & Van Praag, Inc., Standard Office Bldg., Decatur, community high school addn. **$237,000.** CD 8/9—ENR 8/22.

Ill., Red Bud—City, City Hall, municipal light plant addn., incl. purchasing, installing 500 kw. diesel engine. **$104,000.** Russell & Axon, 4903 Delmar Blvd., St. Louis 8, Mo., consult. engrs. CD 2/12/45—ENR 2/22/45.

Ill., Wood River—City, plans by Wm. R. Ittner, Inc., 911 Locust St., St. Louis 1, Mo., rein.-con., brick, stone community center and library, incl. police and city dpt. offices, gymnasium, auditorium kitchen, showers and locker rooms, etc. **$205,000.** CD 11/27—ENR 12/12.

Ill., Zion—Benton Twp. High School Dist. 126, Lake Co., high school addns., incl. gymnasium, offices, bleachers, connecting passages and parking area. **$427,180.**

Ind., East Gary—Bd. School Trustees, East Gary, plans completed by J. H. Wildermuth, 527 Broadway, Gary, 2 story, 65x80ft., and 1 story, 100x115ft., brick, stone, rein.-con., structural steel, laminated wood arch truss school addn., incl. classrooms and gymnasium, **$225,000.** Financing provided. CD 11/20/45—ENR 1/3.

†**Ind., Ft. Wayne**—U. S. Eng., 21 St. and Virginia Ave. N. W., Wash. 25, D. C., 250 bed hospital for Veterans Admin., Vermont Ave. between H and I Sts. N. W., Wash. 25, D. C. **$450,000.**

★**Ind., Indianapolis**—State, R. Gates, gov., State Capitol, brick, stone, state office bldg., New York St. and Capitol Ave. **$1,000,000.** Financing not provided.

Ind., Indianapolis—State, R. Gates, gov., State Capitol, state highway comn. office bldg., Senate Ave. and New York St. **$400,000.** Financing not provided.

★**Ind., Indianapolis**—State Dpt. Conservation, J. Nigh, dir., State Library Bldg., brick, stone Office and State Museum Bldg. **$2,200,000.** Financing not provided; preliminary plans, 2 story brick exhibition bldg., State Fair Grounds. **$250,000.**

Ind., Jasonville—State Dpt. Conservation, J. Nigh, dir., State Library Bldg., Ohio and N. Senate Aves., Indianapolis, 2 story, brick, concrete hotel addn., Shakamac State Park. **$230,000.**

Ind., Lawrenceburg—Dearborn Co. Memorial Co., E. O. Shaughnessy, chn. Bldg. Comn., Lawrenceburg, 3 story, brick, 50 bed hospital. **$350,000.** Financing not provided.

Ind., Veedersburg—Comrs. Fountain Co., Attica, hospital. **$250,000.** Financing provided.

Ia., Audubon—Ind. School Dist., Audubon, plans by J. W. Radotinsky, Commercial Bank Bldg., Kansas City, Kan., school. **$243,000.** Financing not provided.

Ia., Council Bluffs—Independent School Dist. of Council Bluffs, Gerald Kirk., supt., plans by R. C. Robinson, 604 Standard Oil Bldg., Omaha, Neb., brick, concrete, stone school on 8 acre site on Broadway. **$272,500.** CD 6/6—ENR 6/27.

Ia., Ft. Dodge—City plans by Griffith & Griffith, Ft. Dodge, Civic Center bldg. **$750,000.** Financing not provided.

Ia., Glenwood—City municipal light plant. **$249,000.** Financing not provided. Buell & Winter, 508 Insurance Exchange Bldg., Sioux City, consult. engrs.

Kan., Iola—City, generating equip. for power plant. **$415,000.** Financing provided. Brink & Dunwoody, Iola, consult. engrs. CD 10/23—ENR 11/14.

Ky., Burlington—Boone Co., consolidated county high school. **$462,876.**

Me., Gorham—State, male dormitory at State Teachers College. **$219,150.**

★**Md., Bel Air**—Harford Co. Bd. Educ., Junior and Senior High school, **$1,133,500;** consolidated school, **$457,500.**

Mass., Agawam—Town, school, Proj. 1-19-P-230. **$250,000.**

Mass., Palmer—Town, plans by Charles F. Dingman & Assoc., Palmer, civic center bldg., Proj. 1-19-P-205. **$292,000.**

Mass., Plymouth—Town plans by J. William Beal Sons, 185 Devonshire St., Boston, school, Proj. 1-19-P-212. **$300,000.**

Mich., Petosky—City, power plant. **$460,000.** Burns & McDonnell, 107 W. Linwood St., Kansas City, Mo., consult. engrs. CD 9/5—ENR 9/19.

★**Mich., Pontiac**—Bd. Supervs. Oakland Co., Pontiac, plans by L. J. Heenan, Pontiac, brick, steel, stone, rein.-con. Oakland County Infirmary addn. **$1,500,000.**

PUBLIC BLDGS. (Proposed Work, Cont'd.)

Mich., Van Dyke—Warren Twp. Dist. 4, W. S. Schofield, secy. Bd., 23020 Ryan Rd., plans completed by Jensen & Keough, 15875 Jas Couzens Hy., Detroit, brick, steel, stone, concrete school. **$260,000.** Financing provided.

Minn., Minneapolis—Bd. Comrs. Hennepin Co., Court House and Municipal Bldg., Comn., City Hall, 3 or 4 story, 106x110 ft., vault bldg. in inner court of city hall and court house for storing public records. **$210,000-$280,000.** H. E Olsen, city planning engr., 339 City Hall, studying project.

★**Mo., Clayton (St. Louis 5, P.O.)**—Clayton School Dist., J. L. Bracken, supt. Schools, J. T. Friday, pres. Bd. Educ., 7500 Maryland St., rein.-con., brick, stone Senior High School, on 21 acre site adjacent to C. A. Shaw Park, and addns. to Meramec and McMorrow Schools. **$1,000,000** bond election Feb. 4.

Mo., Jefferson Barracks (St. Louis 23, P. O.)—U. S. Eng., 21 St. and Virginia Ave. N. W., Wash. 25, D. C., plans by Jamieson & Spearl, engrs.-archts., Arcade Bldg., St. Louis, 1,097 neuro-psychiatric hospital, for Veterans Adm., Vermont Ave. between H and I Sts. N.W., Wash., 25, D. C. CD 7/24—ENR 8/8.

Neb., Kearney—State Bd. Control, Lincoln, plans by J. P. Helleberg, 418 W. 25 St., housing at Boys Training School. **$345,000.** Financing provided.

Nev., Reno—Washoe Co. General Hospital, Washoe and Mill Sts., plans by Douglas D. Stone & Lou B. Mulloy, assoc., archts., 381 Bush St., San Francisco, Calif., 3 story, bsmnt., concrete, brick veneer hospital addn. incl. 1 wing of 75 beds. Over **$300,000.**

N. H., Somerworth—Bd. Educ. plans by Hersey & Phaneuf, Durham, high school, Proj. 1-27-P-49. **$205,000.**

N. J., Camden—City Bd. Educ., City Hall, school, **$291,100.** Financing provided.

N. J., Dover Twp.—Bd. Educ. plans by Alexander Merchant & Son, 1 Elm Row, New Brunswick, school, Proj. 1-28-P-1. **$418,500.**

N. J., Fair Lawn—Bd. Educ. plans by Fanning & Shaw, 49 Ward St., Paterson, school, Proj. 1-28-P-92. **$260,500.**

N. J., Garfield—Bd. Educ. plans by Lee & Hewitt, 152 Market St., Paterson, school, Proj. 1-28-P-51. **$578,100.**

N. J., Hillsdale—Bd. Educ. plans by Hacker & Hacker, 201 Main St., Ft. Lee, altering school, Trinity Pl., Proj. 1-28-P-346. **$205,000.**

N. J., Hillside—Bd. Educ. plans by Jacob Wind, Jr., 1444 N. Broad St., school, Westminister Sect., Proj. 1-28-P-347. **$454,685.**

N. J., Iselin—Woodbridge Twp. Bd. Educ. plans by Pierson & MacWilliam, 280 Hobart St., Perth Amboy, school, Green St., Proj. 1-28-P-329. **$212,000.**

★**N. J., Jersey City**—Hudson Co., Court House, 12 story administration office bldg. adjacent to Hudson Co. Court House, Newark Ave. and Willow Court, Proj. 1-28-P-348. **$4,080,000.** Frank J. Radigan, Court House co. engr.

N. J., Mt. Ephraim—Mt. Ephraim School Bd., Mt. Ephraim, plans by Edwards & Green, Broadway and Carmen Sts., Camden, school. Over **$205,000.** Financing provided. CD 1/23.

★**N. J., Newark**—Bd. Educ. plans by J. Frederick Cook, 45 Clinton St., South West High School, Proj. 1-28-P-131, **$1,250,000;** Boys Occupational School, Proj. 1-28-P-132, **$1,252,000.** CD 10/23/45—ENR 11/15/45.

N. J., North Brunswick—Bd. Freeholders Middlesex Co., workhouse alterations, addns. **$320,000.**

★**N. J., Plainfield**—Bd. Educ. plans by Ernest T. Brown, 7 Watchung Ave., schools on Arlington and Central Aves., Proj. 1-28-P-350 and Proj. 1-28-P-352, **$460,000** each; 3 story addn. to Maxson School, Proj. 1-28-P-353, **$407,000;** 2 story addn. to Hubbard School, Proj. 1-28-P-354, **$440,000;** school Central St. at E. 7 St., Proj. 1-28-P-355, **$349,000;** school, W. 4 St., **$347,000,** Proj. 1-28-P-356. CD 5/31—ENR 7/11.

N. Y., Barton—Rural Free School Dist. 7, Barton, school. **$300,000.**

N. Y., Brookhaven—Union Free School Dist., Brookhaven, school. **$300,000.**

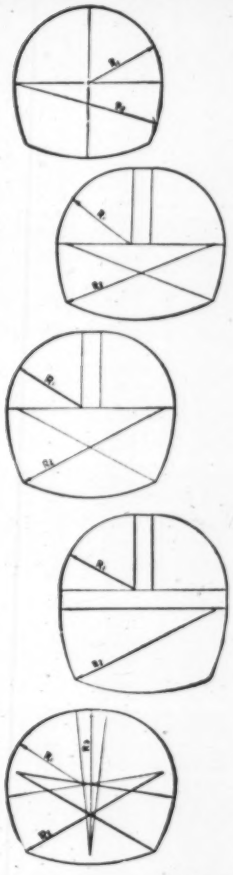
N. Y., Carmel—Bd. Educ., Central School Dist. 2, plans by A. H. Knappe, 368 E. 149 St., New York, Zone 55, school addn., alterations Fair St., Proj. 1-30-P-125. **$500,000.**

★**N. Y., Delmar**—Central School Dist. 6, Towns of Bethlehem and New Scotland, Delmar, plans by J. Russell White, 109 State St., Albany, Zone 7, Junior-Senior High School addn., alterations, Kenwood Ave., Proj. 1-30-P-93, **$305,000;** Senior High School, Kenwood Ave., Proj. 1-30-P-94, **$1,860,000.**

N. Y., Elsmere—Central School Dist. 6, Towns of Bethlehem and New Scotland, Delmar, plans by Walter P. R. Pember, 24 James St., Albany, school addn., alterations, Delaware and Herrick Aves., Proj. 1-30-P-111. **$250,860.** CD 1/25.

N. Y., Farmingdale—Dpt. P. Wks., Albany, plans by E. Post Tooker, 101 Park Ave., New York, Zone 17, frozen foods laboratory, Proj. ED-145 and poultry instruction classroom and disease laboratory, Proj. ED-144, at Long Island Agricultural & Technical Institute, for Dpt. Educ. **$327,000.** CD 9/27—ENR 10/17.

WHERE CROSS-SECTIONS CHANGE FROM STATION TO STATION



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PUBLIC BLDGS. (Proposed Work, Cont'd.)

★**N. Y., Glens Falls**—Union Free School Dist. 1, Town of Queensburg, Glens Falls, high school, Proj. 1-30-P-112. **$1,142,225.**

N. Y., Islip—Islip and Smithtown Central School Dist. 6, Islip, school. **$205,000.**

N. Y., Ithaca—Dpt. P. Wks., Albany, plans by Sherwood Holt, 121 E. Seneca St., garage, animal house, and maintenance shop, Proj. H-27, at Hermann M. Biggs Memorial Hospital for Health Dept. **$170,000.**

N. Y., Moreau—Central School Dist 1 (Moreau, Northumberland and Wilton) Moreau, central school and bus garage addn. **$600,000.**

★**N. Y., New York**—Dpt. P. Wks., Albany, plans under way administration bldg., Proj. MH-186, **$128,000**; medical-surgical bldg., Proj. MH-197, **$4,212,000**; central kitchen, Proj. MH-287, **$600,000**; 2 reception bldgs., Proj. MH-311, **$2,922,000**; bldg. for disturbed continued treatment patients, Proj. MH-312, **$2,843,000**, all foregoing at Manhattan State Hospital, for Mental Hygiene Dpt.

★**N. Y., New York**—New York Public Library, Astor, Lenox & Tilden Foundations, 42 St. and 5 Ave., Zone 18, plans completed by Ayma r Embury II, 150 E. 61 St., Zone 21, and Edgar I. Williams, 126 E. 38 St., Zone 16, 7 story library, 20-30 W. 53 St. **$1,500,000.** Financing provided. CD 7/10/44—ENR 7/27/44.

N. Y., North Hempstead—Union Free School Dist. 6, North Hempstead, school. **$600,000.**

†**N. Y., Patchogue**—War Dpt., Pentagon Bldg., Arlington, Va., plans by Hydrocarbon Research, Inc., consult. engr. and archt., 115 Broadway, New York, atomic research laboratory at Brookhaven Natl. Laboratory. Associated Universities will operate.

N. Y., St. Johnsville—St. Johnsville Central School Dist., plans by Myron Jordan, Richfield Springs, school, Proj. 1-30-P-127. **$412,105.**

N. Y., Sidney—Town, hospital addn. **$205,000.**

N. Y., Walden—Bd. Educ., Union Free School Dist. 5, Montgomery, plans by A. H. Knappe & Assoc., 192 Lexington Ave., New York, Zone 17, Junior and Senior High School, Proj. 1-30-P-47. **$688,000.** CD 5/22—ENR 7/11.

O., Brecksville—Local School Dist. Bd. Educ., plans high school. **$371,000.**

O., South Point—Delta Bd. Educ., South Point, high school. **$500,000.**

Okla., Hugo—Bd. Educ., Hugo, plans by W. H. Lightfoot, Paris, Tex., Junior High School. **$225,000.** Financing provided.

†**Okla., Norman**—Yards & Docks Annex, Navy Dpt., Arlington, Va., plans by L. H. Bailey, Colcord Bldg., Oklahoma City, Naval Reserve Armory and machine shop, on Oklahoma University Campus. **$500,000.** Financing not provided.

†**Okla., Oklahoma City**—Yards & Docks Annex, Navy Dpt., Arlington, Va., plans by L. H. Bailey, Colcord Bldg., Naval Reserve Armory and machine shop, on Oklahoma City University campus. **$675,000.** Financing not provided.

★**Okla., Tulsa**—Tulsa Co. plans by L. B. Senter, Philtower Bldg., negro high school. **$1,000,000.** Land rights not cleared. CD 11/12/45.

Pa., Blakely—City, reconstructing, enlarging municipal electric power plant. **$445,000.**

Pa., Erdenheim (Chestnut Hill, Phila. P. O.)—Springfield Twp. School Dist., Erdenheim, plans by Heacock & Platt, 152 N. 15 St., Phila., school. **$275,000.** Financing provided.

Pa., Perryopolis—Bd. Educ., Perry Twp., plans by Harry W. Altman, 205 Derrick Ave., Uniontown, 2 story, bsmnt. brick, steel high school, near here. **$225,000.**

Pa., Phila.—Dpt. P. Safety, City Hall, plans by Harbeson, Hough, Livingston & Larson, 117 S. 17 St., city hall imprvs., SE-4, **$572,100**; and SE-2. **$351,400.** Financing not provided. Joseph Roletter, city archt. CD 4/12—ENR 7/4.

R. I., Narragansett—Town, Bd. Selectmen, Town Hall, plans by Linwood A. Gardiner, 612 Union Trust Bldg., Providence, and Alexander Knox, consult. archt., 11 E. 44 St., New York, N. Y., brick, steel town hall, Boon and Brown Sts. **$300,000.** Financing not provided. CD 11/7—ENR 11/28.

★**R. I., Providence**—City, plans by James D. Dolgan, city archt., Laurel Hill Ave. Fire Station, Proj. 1-37-P-25, **$116,000**; 7 fire stations, Proj. 1-27-P-26, **$967,750.** W. J. Maguire, city engr.

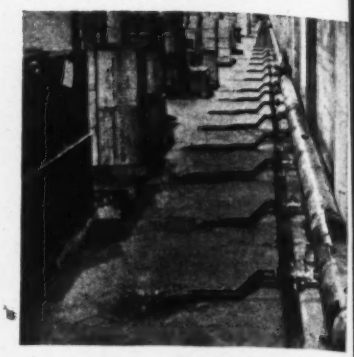
R. I., Providence—City, war memorial bldg., Proj. 1-37-P-29. **$973,500.**

R. I., Providence—Public Library, c/o Henry S. Chafee, chn. Bd. Trustees, Washington St., plans by Howe, Prout & Ekman, 1016 Turks Head Bldg., brick, stone library addns., Washington and Empire Sts. Over **$205,000.**

Tenn., Clarksville—City, c/o mayor, plans by Speight & Hibbs, Clarksville, school for Negro students. **$250,000.**

Tenn., Knoxville—City, c/o City Manager, plans by C. H. McCauley, Jackson Bldg., Birmingham, Ala., nurses home for General Hospital. **$635,000.**

Tenn., Memphis—City, c/o Joe Boyle, comr., fire headquarters bldg. **$750,000.** Financing provided.



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PUBLIC BLDGS. (Proposed Work, Cont'd.)

Tex., Alice—Alice Independent School Dist., Alice, voted bonds concrete, brick, steel School Bldgs. 1 and 2, slab fdns. **$225,000** each. R. L. Vogler, 225 Oleander St., Corpus Christi, archt.

Tex., Canyon—West Texas State Teachers College, girls' dormitory. **$412,000.**

Tex., Carrizo Springs—Dimmit Co., A. A. Kimble, judge, plans by J. G. Smith, Gulf Insurance Bldg., Corpus Christi, hospital. **$300,000.** Financing provided. CD 10/30—ENR 11/14.

Tex., Fayetteville—City, J. F. Chupick, pres., Fayetteville, plans by Wyatt C. Hedrick Co., 3301 Fannin St., Houston, high school. **$211,000.**

Tex., LaPorte—City, Fred R. Ruff, mayor, plans by Wyatt C. Hedrick Co., 5201 Fannin St., Houston, hospital. **$320,660.**

Tex., Magnolia—Independent School Dist., c/o Superintendent, plans by C. R. Lindsley, 2314 McGregor Way, Houston, high school. **$300,000.** Financing not provided.

★**Tex., Marshall**—City, voted bonds, remodeling and school bldg. units **$375,000**; school, **$300,000**; high school **$325,000.**

Tex., Pharr—Pharr-San Juan Independent School Dist., plans by R. L. Vogler, 225 Oleander St., Corpus Christi, 18 rooms, and frame school, concrete slab fdn. **$225,000.**

Tex., Wylie—Bd. Educ., Roy Hall, secy., plans by Roy Kilmer, Greenville, high school. **$275,000.** Financing provided.

Va., Culpeper—Culpeper Co., Culpeper, 2 story high school **$357,800.**

Wash., Greenacres—School Dist. 356, Greenacres, Junior High School. **$417,000.**

Wash., Olympia—City, City Hall, auditorium, **$100,000.** Financing not provided.

★**Wash., Pullman**—Washington State College, Pullman, plans by J. W. Maloney, Larson Bldg., Yakima, classroom bldg. **$1,500,000.** Financing provided.

★**Wash., Seattle**—School Dist. 1, 910 Dexter Ave., plans by W. Mallis, Lyon Bldg., 3 and James St., Zone 4, Junior High School, and converting 2 bldgs. to Junior High Schools, **$1,950,000**; plans by Bebb & Jones and L. W. Bindon, assoc. archt., Hoge Bldg., 2 and Cherry Sts., Zone 4, three schools, replacing Van Asselt, Cascade and Green Lake schools, **$375,000** each. Financing provided. CD 3/21—ENR 6/13.

Wash., Seattle—University of Washington, Henry Bldg., 4 and Union Sts., Zone 1, plans by Young & Richardson, Central Bldg., 3 and Columbia Sts., Zone 4, fisheries bldg. **$600,000.** Financing provided.

Wash., Sequim—School Dist. 323, Sequim, plans by W. Mallis, Lyon Bldg., Seattle, Zone 4, g. school. **$210,000.** Financing provided. CD 3/21—ENR 4/4.

Wash., Tonasket—School Dist. 404, high school and shop bldg. with central heating plant. **$290,000.**

Wis., Eau Claire—Eau Claire Co., plans by Childs & Smith, 430 N. Michigan Ave., Chicago, Ill., courthouse and jail. **$500,000.**

★**Alta., Edmonton**—Wartime Housing, Ltd., 159 Bay St., Toronto, Ont., 250 addnl. wartime houses. About **$1,500,000.**

★**Alta., Lethbridge**—Dpt. P. Wks., Ottawa, Ont., armory at Block U. About **$1,000,000.**

Alta, Stony Plain — Stony Plain Division High School, 23, Stony Plain, plans by J. W. Warren, 7 Hughson St. S., Hamilton, Ont., 2 story, 8x132 ft., concrete block, brick, stone, stucco high school. Approx. **$225,000.**

★**B. C., Vancouver**—City, civic center, incl. art gallery, about **$500,000**; auditorium, about **$1,750,000**; and museum, about **$1,000,000.** CD 2/11/44—ENR 3/2/44.

N. S., Amherst—Bd. School Trustees, Amherst, plans by D. R. MacLean, Amherst, high school. Approx. **$350,000.** CD 3/18.

Ont., Aurora—Bd. Educ., Aurora, school, **$285,000.** Ratepayers voted in favor. CD 4/12.

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PUBLIC BLDGS. (Proposed Work, Cont'd.)

Ont., Geraldton—Bd. Educ., Geraldton, 12-room, 1 story, brick, steel school. About **$225,000.**

Ont., Kitchener—City, water gas plant, incl. 1 bldg. and 2 water gas sets, hydraulically operated, each capable of producing 1½ million cu. ft. gas per day. Approx. **$500,000.** H. Truman, c/o J. Inglis Co., 14 Strachan St., Toronto. engr.

Ont., London—City plans by T. C. McBride, c/o owner, community centre and arena. **$375,000.** M. M. Dillon & Co., Bank of Toronto Bldg., engr. CD 2/11/44—ENR 3/2/44.

Ont., Niagara Falls—Municipality, city hall, branch library and family court bldg. Over **$250,000.** William S. Orr, City Hall, engr. CD 12/10/45—ENR 3/7/46.

Ont., Peterborough—Municipality, civic auditorium and public library addn. in Brock and Water Sts. area. **$300,000.** City Planning Comm., Peterborough, engr.

Ont., Peterborough — Bd. Educ., Peterborough, collegiate in new residential section. **$250,000.**

Ont., Smiths Falls—Bd. Educ., Smiths Falls, ratepayers to vote Jan. 27, school. **$220,000.** CD 11/13—ENR 11/28.

Ont., Sudbury—City, H. P. McKeoun, clk., plans by J. B. Sutton, 99 Larch St., civic bldg., on Central Public School Grounds. About **$750,000.** CD 11/18/44—ENR 12/14/44.

Ont., Tillsonburg—Tillsonburg Soldiers Memorial Hospital Bd., J. Stubbs, pres., Brock St., hospital addn., Ralph St. About **$250,000.** G. C. Elchenberg, mayor.

Ont., Toronto—Dpt. P. Wks., Ottawa, plans by Allward & Gouinlock, 57 Bloor St. W., 3 and part 4 story, 45x170 ft., rein.-con. outpatients clinic exten. at Sunnybrook Military Hospital, North York Twp. About **$300,000.**

Que., Quebec City—Provincial Govt. Dpt. P. Wks., Quebec City, plans by J. A. Bigouesse, 53 St. Louis St., government office bldg. About **$500,000.** CD 3/28/45—ENR 4/12/45.

★**Que., Sherbrooke**—Bd. Governors, Sherbrooke Hospital, G. Armitage secy., plans by J. C. McDougall, 1235 McGill College Ave., Montreal, hospital, top of Portland Ave. **$1,200,000.** McDougall & Friedman, 1235 McGill College, Ave., Montreal, engrs. CD 5/3—ENR 7/11.

Sask., Regina—Wartime Housing Ltd., 159 Bay St., Toronto, Ont., 150 wartime houses. About **$900,000.**

COMMERCIAL BUILDINGS

PROPOSED WORK

Calif., Long Beach—Del Amo Gardens, Inc., c/o H. Gibbs, archt., 441 E. First St., plans 50% completed, 12 frame, stucco bldgs., Del Amo and Long Beach Blvds. Over **$205,000.**

Conn., Glastonbury—Laura Hale Gordon, c/o N. F. Prentice, archt., 805 Main St., Hartford, 2 story, bsmnt, brick apartments, Main St. Over **$205,000.** CD 6/14—ENR 6/26.

Mass., Stockbridge—Liberal Arts College, Inc., Dr. Stringfellow Barr, pres. and dean, Stockbridge, college, Dan Hanna Estate. Over **$205,000.** Financing provided.

Okla., Oklahoma City—St. Lukes Methodist Church, 201 N. W. 8 St., church, N. W. 14 and Harvey Sts. **$800,000.** Financing not provided, land rights not cleared.

Pa., Lansdale—Elm Terrace Hospital, plans by Louis E. Jallade, 597 5 Ave., New York, N. Y., hospital addn. Over **$205,000.** Financing provided. CD 4/15—ENR 4/25.

S. C., Charleston—James F. Condon & Sons, King and Warren Sts., plans by Simons & Lapham, Peoples Bldg., department store. **$450,000.**

Tenn., Columbia—Nile Yearwood, c/o Chamber of Commerce, hotel. **$205,000.** Financing provided.

Tex., Dallas—Arnold J. Weil, Cotton Exchange Bldg., plans by Arnold J. Weil, Cotton Exchange Bldg., 2 story, brick, steel medical center, concrete slab fdn. **$250,000.** Financing provided.

★**Tex., Harlingen**—Rogers Lacy, Longview, plans by Frank Lloyd Wright, Spring Green, Wis., 450 room hotel. **$1,000,000.** Financing provided.

Alta., Edmonton—Local Medical Group, c/o Rule, Wynn & Rule, archts., 300 Birks Bldg., 6 story medical arts bldg., Macdonald Dr. between 101 and 102 Sts. About **$650,000.**

Alta., Lethbridge—S. S. Kresge Co. Ltd., 210 Dundas St. W., Toronto, Ont., store, Fourth Ave. and Sixth St. S. About **$225,000.**

N. S., Halifax—Odeon Theater of Canada, Ltd., 4 King St., Toronto, Ont., plans by I. English, 2 King St. E., Toronto, Ont., theater, Spring Garden Rd. About **$250,000.** CD 5/29—ENR 6/6.

Que., Rimouski—Owner c/o P. Warren, engr., 105 Cote de la Montagne, Quebec City, plans by A. Leclere, 109 de l'Eveche Ave., 100 room hotel, St. Germain St. About **$275,000.**

INDUSTRIAL BUILDINGS

PROPOSED WORK

Ind., Cannelton—FACTORY—Lehman Co., E. F. Clemens, pres., rebuilding 3 story, brick factory. **$500,000.**

INDUSTRIAL BLDGS. (Proposed Work, Cont'd.)

★**O., Euclid**—RESEARCH CENTER—Diamond Alkali Co., Oliver Bldg., Pittsburgh, Pa., research center. **$2,000,000.** Legal obstacles to be overcome.

Pa., Phila.—PLANT—Phila. Electric Co., 1000 Chestnut St., plans under way plant addns., 1615 N. 19 St. **$108,000.** Financing provided.

Tenn., Knoxville—LUMBER MILL—W. M. Ritter Lumber Co., New River, Knoxville, rebuilding lumber mill. **$100,000.** Financing provided.

Tex., Dallas—PLANT—Regina Mfg. Co., 939 S. Lamar St., 2 story mfg. plant. **$150,000.** Financing provided. Site purchased.

★**Tex., Houston**—PLANT—National Steel Products Co., Lockwood Dr. at Armour Dr., plans under way mfg. plant, warehouse, and office. Approx. **$1,000,000.** CD 12/6.

Tex., Rockdale—PLANT—Elgin Standard Brick Mfg. Co., Elgin, plans under way, brick, tile mfg. plant. **$100,000.** Financing provided. Site purchased.

★**Tex., Spearman**—COMPRESSOR STATIONS—Michigan-Wisconsin Pipe Line Co., c/o Michigan-Consolidated Gas Co., 415 Gilford St., Detroit, Mich., plans under way, addnl. compressor stations. **$1,500,000.** Financing provided.

Alta., Edmonton — WAREHOUSE — Beatty Bros., Ltd., R. D. Kerr, secy., Hill St., Fergus, Ont., plans by Rule, Wynn & Rule, 300 Birks Bldg., 3 story warehouse. About **$175,000.** CD 7/10—ENR 7/25.

Ont., Toronto—WAREHOUSE, etc.—Parke Davis & Co. Ltd., 2301 Sandwich St. E., Windsor, drug warehouse and office, Fleet St. W. west of Bathhurst St. About **$150,000.**

UNCLASSIFIED

PROPOSED WORK

Alabama—RURAL DISTRIBUTION LINES—Clarke-Washington Electric Co-operative, Jackson, plans completed sys. imprvs. and 389 mi. rural distr. lines, Clarke Co. **$565,000** REA allot.

Alabama—RURAL DISTRIBUTION LINES—South Alabama Electric Co-operative, Troy, plans completed sys. imprvs. and 477 rural distr. lines, Pike Co. **$760,000** REA allot.

Arkansas—RURAL DISTRIBUTION LINES—Woodruff Electric Co-operative, Inc., Augusta, plans completed 252 mi. rural distr. lines, Woodruff Co. **$335,000** REA allot.

Ala., Jacksonville — STADIUM — State Teachers College, c/o pres., Jacksonville, stadium. Over **$40,000.** (Correction—status) CD 11/20—ENR 11/28, under CA.

Georgia—RURAL DISTRIBUTION LINES—Washington Co. Electric Co-operative, Sandersville, plans completed sys. imprvs. and 296 mi. rural distr. lines, Washington Co. **$475,000** REA allot.

Illinois—RURAL DISTRIBUTION LINES—Illini Electric Co-operative, Champaign, plans completed sys. imprvs. and 70 mi. rural distr. lines, Champaign Co. **$136,000** REA allot.

Illinois—RURAL DISTRIBUTION LINE—Spoon River Electric Co-operative Inc., Canton, plans completed sys. imprvs. and 75 mi. rural distr. line, Fulton Co. **$138,000** REA allot.

Indiana—RURAL DISTRIBUTION LINE—Morgan Co. Rural Electric Co-operative, Martinsville, plans completed sys. imprvs., Morgan Co. **$115,000** REA allot.

Indiana—RURAL DISTRIBUTION LINE—Shelby Co. Rural Electric Co-operative, Shelbyville, plans completed sys. imprvs. and 92 mi. rural distr. line, Shelby Co. **$150,000** REA allot.

Iowa—RURAL DISTRIBUTION LINES—Greene Co. Rural Electric Co-operative, Jefferson, plans completed, 220 mi. rural distr. lines, Greene Co. **$305,000.** REA allot.

Kentucky—RURAL DISTRIBUTION LINES—Blue Grass Rural Electric Co-operative, Nicholasville, plans completed, sys. imprvs. and 150 mi. rural distr. lines, Jessamine Co. **$270,000** REA allot.

Kentucky—RURAL DISTRIBUTION LINES—Owen Co. Rural Electric Co-operative, Owenton, plans completed sys. imprvs. and 248 mi. rural distr. lines, Owen Co. **$575,000** REA allot.

Louisiana—RURAL DISTRIBUTION LINES—Concordia Electric Co-operative Inc., Ferriday, plans completed sys. imprvs. and 87 mi. rural distr. lines, Concordia Co. **$140,000** REA allot.

Me., Georgetown—PARK—State Park Comn., Augusta, developing 350 acres, Reid State Park, Proj. 1-17-P-49, 2 mi. south of here, Sagadahoc Co. **$212,560.**

Mass., Fall River—SPORTS ARENA—Mark Realty Co., 56 N. Main St., Fall River, plans by G. S. Darling, 184 Bank St., 210x245 ft., rein.-con. sports arena, Pocasset Mill Sect. **$500,000.** A. Ehrenzeller, 329 Washington St., Dorchester, heating engr.

Missouri—RURAL DISTRIBUTION LINES—Central Missouri Electric Co-operative, Sedalia, 241 mi. rural distr. lines, Pettis Co. **$305,000** REA allot. F. Horton & Co., Lamar, consult. engrs. CD 7/15—ENR 11/28.

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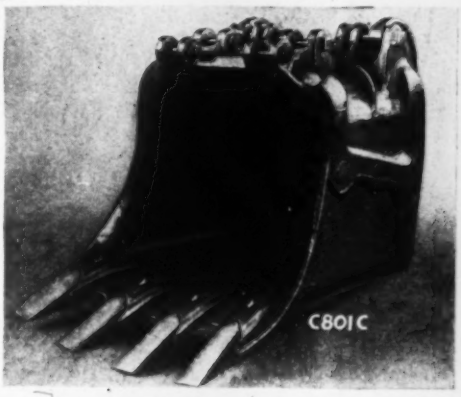
To meet demands for a dipper with optimum durability and minimum overall weight the Amsco All-Manganese Steel Welded Type Dipper has been developed and thoroughly service-tested. These dippers have stood up staunchly in such rugged applications as steel slag recovery, iron ore mining and handling coral rock.

Design, in a dipper, affects durability, but the use of austenitic manganese steel, "the toughest steel known," as the sole material of construction in these dippers, except for small complementary parts, assures maximum resistance to impact and wear.

The important factors of design in a power shovel dipper are those which contribute to faster, more efficient digging, full loading, with maximum proportion of power consumption applied to payload, quick dumping and longer life. All these characteristics are embodied in the Amsco All-Manganese Steel Welded Type Dipper.

When fitted with a door and bail of adequately strong design, this dipper is somewhat lighter in weight than the Amsco Renewable Lip Dipper, thousands of which have been put into use since 1928. If made with a lightly constructed door and hinges, as generally used in light weight dippers, it will not exceed the weight of any composite-type fabricated dipper that is sufficiently strong to do a good job. The dippers illustrated have the advantage of a manganese steel body welded into an operating unit. The body is as strong and homogeneous as if made in one piece. At the same time it is possible to remove a worn front and weld on a new one without destroying the back.



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The Amsco All-Manganese Steel Welded Type Dipper is made in capacities of ¾ yd. and up. Sizes ¾ to 2 yd. are made in two body pieces; front and back. Sizes over 2 yd. are made in four pieces; front, back and two side plates. Write for full information.

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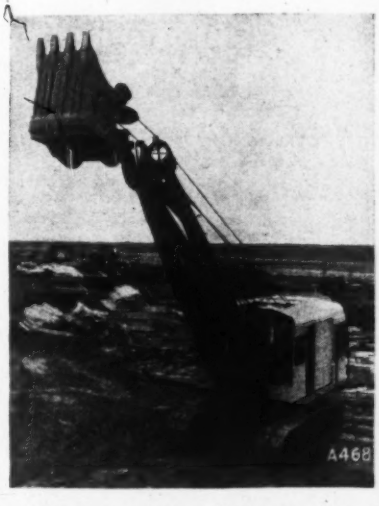

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UNCLASSIFIED (Proposed Work, Cont'd.)

Missouri — RURAL DISTRIBUTION LINE—Osage Electric Co-operative Inc., El Dorado Springs, plans completed, sys. imprvs. and 154 mi. rural distr. lines, Cedar Co. **$228,000** REA allot.

Missouri—RURAL DISTRIBUTION LINES—Three Rivers Electric Co-operative, Linn, 238 mi rural distr. lines, Osage Co. **$373,000** REA allot. Horton Engr. Co., Lamar, engr. CD 11/15—ENR 11/28.

Missouri—RURAL DISTRIBUTION LINES—Webster Electric Co-operative, Marshfield, plans completed, sys. imprvs. and 223 mi. rural distr. lines, Webster Co. **$315,000.** REA allot.

Mo., St. Louis—BROADCASTING STATION—Globe-Democrat Publishing Co., 1137 Franklin Ave., St. Louis, Zone 1, plans by Mauran, Russell, Crowell & Mullgardt, Chemical Bldg., 721 Olive St., Zone 1, broadcasting bldg. (Station KWGD), incl. 2 story, bsmt, rein.-con. brick, steel, stone structure covering south part of city block bounded by 12 Blvd., Cole, 13 and Carr Sts. with heavy foundation to support 525 ft. tower and antenna, air-conditioning. W. C. E. Becker, 411 N. 7 St., Zone 1, structural engr. J. D. Falvey, 316 N. 8 St., Zone 1, mechanical and electrical engr. CD 8/30/44—ENR 9/21/44.

Montana—RURAL DISTRIBUTION LINES—Yellowstone Valley Electric Co-operative Inc., Huntley, plans completed, sys. imprvs. and 145 mi. rural distr. lines, Yellowstone Co. **$325,000.** REA allot.

Nebraska—RURAL DISTRIBUTION LINES—Pine Bluffs Rural Electric Co., Sidney, 490 mi. rural distr. lines, Cheyenne Co. Approx. **$550,000.**

Nebraska—RURAL DISTRIBUTION LINES—Seward Co. PP Dist., Seward 131 mi. rural distr. lines, Seward Co. **$182,000** REA allot. Heningson Eng. Co., Standard Oil Bldg., Omaha, engr.

Nebraska—RURAL DISTRIBUTION LINES—Southern Nebraska PP Dist., Grand Island, rural distr. lines, Hall Co. **$674,000** REA allot. Raymond Reed, Columbus, engr.

N. J., Trenton — PARK, etc. — Ewing Twp. Comn., Pennington Rd., park development, recreational facilities, Ewing Twp. Over **$100,000.** Financing not provided.

N. Y., Herkimer—RECREATION FIELD—Village, recreation field. **$200,000.**

N. Y., New York—ATHLETIC FIELD HOUSE—Columbia University, 116 St. and Broadway, plans completed by Eggers & Higgins, 542 Fifth Ave., Zone 19, athletic field house north side of W. 218 St. at Baker Field. **$500,000.** Financing provided.

North Carolina—RURAL DISTRIBUTION LINES—Haywood Electric Membership Corp., Waynesville, plans completed 165 mi. rural distr. lines, Haywood Co. **$218,000** REA allot.

N. C., Raleigh—ARTIFICIAL LAKE, etc.—State Bd. Agriculture, artificial scenic lake, **$63,300;** paving, incl. curb, gutters and drainage. **$206,250.**

North Dakota—RURAL DISTRIBUTION LINES—Minnkota Power Co-operative, Inc., Grand Forks, plans completed sys. imprvs. and 39 mi. rural distr. lines, Grand Forks Co. **$166,000** REA allot.

O., Reading—SWIMMING POOL etc.—City, swimming pool, bathhouse, stadium, athletic field and playgrounds. **$135,000.**

★**O., Toledo**—PLAYGROUNDS, SWIMMING POOLS—C. A. Wertz, city welfare dir., playground on 20 acre site at Sylvania and Douglas Rds., inc. swimming pool, **$213,320;** wading pool and extended playgrounds at Asbury Park, **$51,050;** Oakland Play Field, 23 acres, incl. adult swimming pool, recreation bldg. and play areas, **$231,515;** Sherman Playground, wading pool and playground, **$76,290;** 94 acre park site development, Tremainesville and Jackman Rds., **$286,850;** wading pool and playground, Lagrange and Ontario Sts., **$65,000;** city park exten. incl. swimming pool, **$379,300;** Hathaway playground, **$21,750;** Oakdale playground and wading pool, **$86,590;** Tiffin St. wading pool and shelter bldg., **$41,790;** Interior St. playground, **$14,370.** CD 9/7/45—ENR 9/20/45.

O., Toledo—TELEVISION STATION—Fort Industry Co., Hron St., plans by Bellman, Gillett & Richards, 518 Jefferson St., 2 story modernistic bldg., incl. sound stages, film storage rooms, etc., 500 ft. television tower, etc., on 124x214 ft. site, Superior St. between Lafayette and Market Sts. **$463,000.** Financing not provided. CD 2/27—ENR 3/21.

Oklahoma—RURAL DISTRIBUTION LINES—Oklahoma Gas & Electric Co., 321 N. Harvey St., Oklahoma City, plans 50% completed, rural distr. lines from Ponca City plant to Enid and El Reno. **$978,000.** Financing provided.

Oklahoma—RURAL DISTRIBUTION LINES—Tri-County Electric Co-operative, Inc., Hooker, plans completed sys. imprvs. and 240 mi. rural distr. lines, Texas Co. **$300,000** REA allot.

†**Oregon and Washington**—TRANSMISSION LINES—Bonneville, Power Admin., P. O. Box 3537, Portland, Ore., 24.1 mi. 115,000 volt three phase transmission line from The Dallas, Ore., to Goldendale, Wash., **$450,000;** 11.2 mi. 69.00 volt three phase, H-frame wood pole transmission line from Mossyrock to Morton, Wash., **$100,000.**

UNCLASSIFIED (Proposed Work, Cont'd.)

★ †**Oregon**—POWER TRANSMISSION LINES—Bonneville Power Admin., P. O. Box 3537, Portland, power transmission line from Klamath Falls to Madras. **$6,000,000**; substation at Klamath Falls. **$2,200,000.**

Oregon — ELECTRICAL SYSTEM — Union County People's Utility Dist., La Grande, electrical sys., Union Co. **$450,000.**

Pa., Allentown—STADIUM, etc.—City plans under way; stadium, over **$250,000**, Financing provided; parks, over **$50,000**, Financing not provided.

R. I., Providence—RECREATION ATHLETIC FIELD—City, plans by James D. Dolgan, city archt; recreation and athletic field adjacent to Hope St. and Mt. Pleasant Ave. Senior High Schools, Proj. 1-37-P-28. **$836,000.** W. J. Maguire, city engr.

R. I., Westerly—ATHLETIC FIELD, etc.—Town, athletic field and recreation center, Franklin St. Proj. 1-37-P-30. **$165,000.** CD 3/22/45—ENR 4/5/45.

South Carolina—RURAL DISTRIBUTION LINES—Palmetto Electric Co-operative, Inc., Ridgeland, plans completed sys. imprvs. and 130 mi. rural distr. lines, Jasper Co. **$219,000** REA allot.

Tennessee—RURAL DISTRIBUTION LINES—Mountain Electric Co-operative, Mountain City, plans completed sys. imprvs. and 204 mi. rural distr. lines, Johnson Co. **$405,000** REA allot.

Tenn., Chattanooga—STADIUM—University of Chattanooga, McCallie Ave., stadium addn. at Chamberlain Field. **$300,000.** Financing provided.

Tenn., Memphis—STADIUM—City, c/o Park Comn., 50,000 seat concrete, steel football stadium. Over **$100,000.** Financing not provided.

Texas—GAS PIPELINE—Amarillo Oil Co., Amarillo, plans under way 16 in. natural gas pipeline main from Panhandle field to city limits of Amarillo, **$2,500,000**; reconditioning 8 and 12 in. natural gas pipeline between Panhandle Fields and Amarillo, Potter Co. **$200,000.** Financing provided.

Texas—RURAL DISTRIBUTION LINES—Cap Rock Electric Co-operative, Stanton, plans under way, 272 mi. rural distr. lines and sys. imprvs., Martin Co. **$290,000** REA allot.

Texas—RURAL DISTRIBUTION LINES—Houston Co. Electric Co-operative, Inc., Crockett, plans under way 163 mi. rural distr. lines and sys. imprvs., Houston Co. **$273,000** REA allot.

Texas—RURAL DISTRIBUTION LINES—Karnes Electric Co-operative, Inc., Karnes City, 300 mi. addnl. rural distr. lines, Karnes Co. **$336,000** REA allot. Beavers & Lodal, 1411 Transit Tower, San Antonio, consult. engrs. CD 9/20—ENR 10/3.

Texas—RURAL DISTRIBUTION LINES—San Bernard Electric Co-operative, Inc., Bellville, 179 mi. rural distr. lines, Austin Co. **$192,000.** Financing provided. H. B. Gieb & Assoc., 1207 Texas Bank Bldg., Dallas, consult. engrs. CD 6/14—ENR 6/27.

Tex., Bellaire—FIRE PROTECTION SYS.—City, Abe Zindler, mayor, electric fire protection sys. **$275,000.** Financing not provided. J. B. Danenbaun, Bellaire, engr. CD 10/9—ENR 10/31.

★ **Tex., Galveston** — TUNNEL — Theo. R. Robinson, judge, Galveston Co., vehicular tunnel with ventilation bldgs., transition island, toll booths, trestle and approach roads, electric and ventilating equip. **$10,125,000.** Palmer & Baker, Inc., P. O. Box 346, Mobile, Ala., consult. engr.

Tex., Mineral Wells—PARK, etc.—Young Men's Christian Assn., 605 N. Ervay St., and Boy Scouts of America, Thomas Bldg., Dallas, developing 777 acre park, playground, and summer camp at Possum Kingdom Lake, near here. **$225,000.** Financing provided.

Utah—RURAL DISTRIBUTION LINES—Moon Lake Electric Assoc., Inc., Mt. Emmons, plans completed, sys. imprvs. and 169 mi. rural distr. lines, Duchesne Co. **$365,000** REA allot.

Washington — RURAL DISTRIBUTION LINES—Nespelem Valley Electric Co-operative, Inc., Nespelem, plans completed 183 mi. rural distr. lines, Okanogan Co. **$245,000** REA allot.

Territory of Hawaii — PARK IMPROVEMENTS — Territory of Hawaii, Honolulu, repairing damage to stone walls and grounds at Xaimu Park, Kalapana, Puna; constructing men's and women's bathhouses, watermains, sewerage, also grading grounds and access roads, at Kolekole Park, Dist. of South Hilo; boathouse, grading, replanting, repairing to caretakers cottages at Liliuokalani Park, 4 pavilions, outdoor stage, grading grounds, replacing seawalls and resurfacing connecting roads, etc. at Onekahakaha Beach Park, bathhouses, pavilion and outdoor grill, repairing masonry walls, grading grounds and pontoon bridge on island of Cocoanut Island Park, repairing band stand and pavilion, grading grounds, sidewalks and driveways at Mooheau Park, all foregoing at Hilo. **$2,000,500.**

★ **Ont., Toronto**—SWIMMING POOLS—City, R. H. Saunders, mayor, plans under way first of 5 city park swimming pools, to be built for Willowvale Pool. **$210,000.** Total est. $1,000,000. T. S. Gillies, Dpt. Bldgs., c/o owner, engr. CD 8/31/45—ENR 9/13/45.

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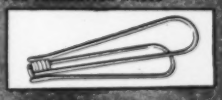

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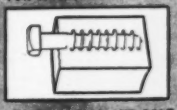

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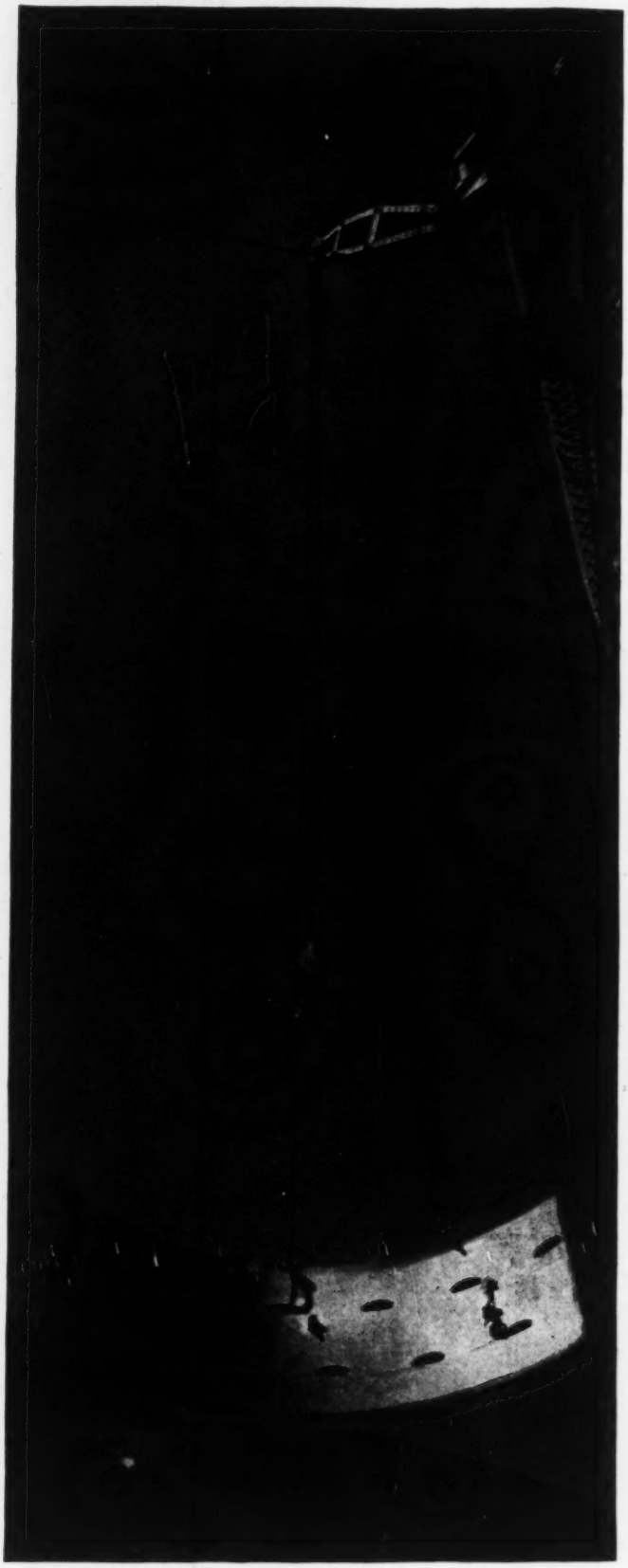

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WATER SUPPLY

BIDS ASKED

Bids Asked Early in January

Ala., Carrville—City, c/o Mayor, WW imprvs. $40,000. Plans deposit $25. CD 11/5/45—ENR 11/29/45.

Bids Asked January 6

Okla., Muskogee—City Clerk, water treatment and control equip., chlorinating equip, pumps, piping, valves, elevator, conveyor and office equip. for treatment plant. $200,000. Plans deposit $50. Benham Eng. Co., American Bank Bldg., Oklahoma City, engr. CD 9/25—ENR 10/17.

Bids Asked January 9

Tex., Knox City—City, Roy A. Baker, mayor, water supply well, brick, concrete pump house, etc. $35,000. Plans deposit $15. J. E. Ward, 545 Allison-Duncan Bldg., Wichita Falls, engr.

Bids Asked January 10

Calif., Sacramento—City, City Hall, Sect. 3, 24 in. welded steel watermain from present terminus of 24 in. welded steel main at 51 and R Sts. westerly on R St. to 45 St., removing present 16 in c.i. watermain; Sect. 4, 24 in. x ¼ in. welded steel pipeline from present terminus of 24 in. welded steel line on south side of S.P. rt. of way at 59 and R Sts. southerly on 59 St. to 5 Ave., then westerly on 5 Ave. to 58 St., terminating on 5 Ave. at 58 St. P. Klaus, City Hall, Sacramento, city engr. CD 11/12/45—ENR 11/29/45.

Bids Asked January 20

N. Y., Poughkeepsie—Bd. P. Wks., W. J. Davis, clk., furnishing, installing pumping equipment. Plans deposit $10. Malcolm Pirnie Engineers, 25 W. 43 St., New York, Zone 18, engrs.

Bids Asked

O., Akron—M. L. Davis, service dir., City Hall, 24 in. pipe for main feeder water line from airport dist. along E. Archwood Ave. to Firestone Blvd. $100,000. Wendell R. LaDue, city water and sewer div. head. CD 1/11.

LOW BIDDERS

Fla., Dania—City, Dec. 12, WW imprvs., pipework and filtration plant, from Murphy Constr. Co., West Palm Beach, $167,813 and $28,500 respectively; elevated tank, from R. D. Cole Mfg. Co., Newnan, Ga. $43,000. CD 10/31—ENR 11/7.

Fla., Gainesville—City, Dec. 16, water filtration plant, from J. A. Jones Constr. Co., Walton Bldg., Atlanta, Ga. $409,000. CD 11/14—ENR 11/21.

N. Y., New York—Bd. Water Supply, 120 Wall St., received no bids Dec. 17. Contr. 363 furnishing, testing, del. 2 deep well pumps and 26 smaller pumps with electric motors, appurtenances for Chambers of Delaware Aqueduct. CD 12/6—ENR 12/12.

Tex., Luling—City, project abandoned, water supply (steel) storage tanks, 300,000 gal. steel tower and tank. Bids 9/25 rejected. CD 9/10—ENR 9/12.

CONTRACTS AWARDED

Ark., Clarendon—City, water and sewerage sys. imprvs., extens., to Worth James Constr. Co., Pyramid Bldg., Little Rock. $112,252. Bids 11/1. CD 10/23.

Tex., Richardson—E. D. Wallace, Richardson, c. i. waterlines, facilities, own forces. $35,000.

SEWERS, WASTE DISPOSAL

BIDS ASKED

Bids Asked January 6

Okla., Muskogee—City Clerk, 12 mi. 8- to 18-in. sanitary main sewers. $300,000. Plans deposit $25. T. P. Clonts, Metropolitan Bldg., engr. CD 9/25—ENR 10/17.

LOW BIDDERS

★**Calif., Los Angeles**—City, City Hall, Dec. 11, headworks structure at Hyperion, from J. I. Barnes Constr. Co., 1119 Montana St., Santa Monica. $1,232,161. (**Correction**—Low Bidder) CD 12/16—ENR 12/19, under LB.

Calif., Oceanside—City, City Hall, rejected bids Dec. 11, sanitary sewers in San Diego St., etc., Spec. 460812. L. B. $115,765. CD 12/2.

★**Calif., Stockton**—City, City Hall, rejected bids Dec. 2, South Sewage Treatment Plant imprvs., addns. L. B. $2,457,000. CD 12/6—ENR 12/12, under LB.

D. C., Wash.—Distr. Comrs., District Bldg., Dec. 12, Dupont Circle Underpass stormwater sewer, P St. N. W. between Rock Creek and Dupont Circle, from Leo Butler Co., 8416 Georgia Ave., Silver Spring, Md. $183,493. CD 12/4.

Mich., Warren—Warren Twp. Sewage Dist. 10, 80,000 ft. 8- to 24-in. diam. vitr. and concrete sewer, manholes, appurtenances, from Gargaro Co., 40 7 Mile Rd. E., Detroit, Zone 3. $358,490. CD 11/13—ENR 11/28.

★**N. Y., New York**—Dpt. P. Wks., Municipal Bldg., Zone 7, Contr. 24, East Bronx Intercepting Sewer, Wards Island Sewage Treatment Works, from Del Balso Contg. Co., 220 East 42 St. $1,396,000. CD 12/3—ENR 12/5.

CONTRACTS AWARDED

Calif., Hughson—Hughson Sanitary Dist., 365 Hughson Ave., Unit 2, domestic sewage disposal facilities and Unit 3, industrial sewage facilities, force account. Over $80,000. L. Cedric Macabee, 156 University Ave., Palo Alto, engr.

D. C., Wash.—Distr. Comrs., District Bldg., storm water sewers, 55 St. and Blaine St. N. E., to J. D. McIlvaine Co., 925 12 St. N. E. $77,255. Bids 11/15.

Kan., Scott City—City, sanitary sewer extens., to Burt & Binford, Hutchinson. $45,734. Est. $50,000. Bids 12/10. CD 11/21—ENR 11/28.

Kan., Smith Center—City, c/o City Clerk, general contract sewage disposal plant, to Douglas Constr. Co., 510 E. 15 St., Topeka. Est. $50,000. CD 12/19/45—ENR 1/10/46.

Mont., Billings—City, City Hall, disposal plant and sewer lines, to B. O'Leary, 423 N. 32 St., $183,363. Est. $700,000. Black & Veatch, 4706 Broadway, Kansas City, Mo., engrs.

O., Cincinnati—Bd. Comrs., Hamilton Co., installing 6,200 ft. 12- to 41-in. sewer lines in McFarland Woods sect., Green Twp., to O'Connell & Sweeney, Kellogg and Tennyson Aves. $42,305. Est. $45,000. Bids 11/13.

O., Columbus—Bd. Comrs. Franklin Co., installing approx. 8 mi. 8- to 15-in. concrete and vitr. clay sewer pipe in Perry Twp., to H. E. Miller, 2959 Crescent Dr., $133,086. Bids 11/15, Burgess & Niple, 568 E. Broad St., engr.; 3 mi. 24 in. sanitary sewer line in Truro Twp., to Rhoten-Frysinger Co., 16 E. Broad St., $222,611. Bids 10/15, Jennings-Lawrence Co., 12 N. Third St., engr. A Slade, co. engr.

PROJECTS COVERED

Projects—By Size

Construction projects here reported cover the United States and Canada, are of these minimum sizes or larger: water supply, earthwork, waterworks $22,500; other public works $40,000; industrial buildings $55,000; other buildings $205,000.

Classes of Construction

(Name in order of Listing)

Water Supply
Sewers, Waste Disposal
Bridges
Streets & Roads
Earthwork, Waterways
Latin America
Public Buildings
Commercial Buildings
Industrial Buildings
Unclassified

Stages Reported

PROPOSED WORK: Including appointment of engineers or architects.

BIDS ASKED (new announcements only). For full calendar, see also preceding issues of ENR.;

LOW BIDDERS: On jobs below $500,000 value all low bidder news will be the final reports published on the projects involved except where award is not made to the low bidder. In this case, a supplementary contract award report will be published.

CONTRACTS AWARDED: Except awards to low bidders previously reported in low bidder stage.

Dates shown are of issue in which last previous report was published.

Symbols and Abbreviations Include:

† Federal Government
★ Project of $1,000,000 or over.
ENR Engineering News-Record
CD Engineering News-Record Construction Daily

O., Columbus—City, 3,150 ft. 12- to 18-in. sewers in High St. and Torrence Rd., to Thompson-Conie Co., 1340 Windsor Ave. $39,710. Est. $43,000. Bids 11/19. CD 11/19/45—ENR 11/29/45.

Pa., Eagleville—Eagleville Sanitorium for Consumptives, 1332 Fitzwater St., Phila., sewage disposal plant, to Frank V. Radomski, 244 W. Queen Lane, Phila. Over $40,000. Bids 10/15, awarded 12/10. CD 10/2—ENR 10/10.

Tex., Richardson—E. D. Wallace, Richardson, sanitary sewers, own forces. $40,000.

BRIDGES

BIDS ASKED

Bids Asked January 3

†**Nebraska**—U. S. Eng., Davidson Bldg., Kansas City, Mo., river-channel construction bridge, Harlan Co. W. E. Potter, dist. engr. CD 8/20—ENR 8/22.

Bids Asked January 9

Florida—State Rd. Dpt., Tallahassee, replacing timber bridge on west end with concrete deck-steel I-beam approach spans on concrete pile bents, constructing one 107 ft. vertical lift span, over North River, Rd. A1A, S.P. Job 7803-109, St. Johns Co. $225,000. H. P. Coloney, state hy. engr.

Kansas—State Hy. Dpt., Ottawa, Br. 13.9, 64 ft. riveted truss span and two 16 ft. I-beam spans, Proj. 4246, Coffey Co.; Br. 31 plus 74, two 10x7x26 ft. rein.-con. box bridge, Proj. S-218 (2), Franklin Co. R. C. Keeling, Topeka, engr.

LOW BIDDERS

California—State Div. Hys., 808 State Bldg., Los Angeles, overcrossing at Esperanza St., undercrossing Indiana St., and undercrossing Santa Ana Parkway at Olympic Parkway, from Haddock Co., 3538 E. Foothill Blvd., Pasadena. $259,144 and $317,090 respectively. CD 11/13—ENR 11/14.

Connecticut—State, W. J. Cox, comr., Hartford, Dec. 16, bridge in Hamden, from Marianni Constr. Co., 222 Forbes Ave., New Haven. $244,181. CD 12/4—ENR 12/12.

Florida—State Hy. Dpt., Tallahassee, Dec. 12, bridges, Volusia Co., from R. H. Wright & Son, Chatham Field, Ft. Lauderdale. $182,423. CD 11/26—ENR 12/5.

Ill., Chicago—City, Dpt. P. Wks., City Hall, Dec. 16, substructure fixed highway bridge over Calumet River at E. 130 St., from Great Lakes Dredge & Dock Co., 122 S. Michigan Ave. $268,050. CD 12/10.

Michigan—State Hy. Dpt., Lansing, Dec. 3, rein.-con. earth filled bridge, Baraga Co., from Straits Constr. Co., St. Ignace. $49,811. CD 11/27.

Michigan—State Hy. Dpt., Lansing, from E. C. Nolan & Son, 8121 Warren Blvd., Centerline, bridges in Saginaw Co., $57,582; St. Clair Co., $51,739; Tuscola Co. $72,561.

Ohio—State Hy. Dpt., Columbus, rejected bids Dec. 10, reconstructing culvert, Cuyahoga Co. L.B. $11,963. CD 12/3—ENR 12/5.

Tex., Texarkana—City, S. H. Atkinson, mayor, project abandoned viaduct (overhead) over Missouri Pacific Railroad crossing at airport. $100,000. CD 11/15/43 — ENR 11/18/43.

Tex., Waco—City, project abandoned, bridge across Brazos River. Over $100,000. Coy Borders, City Hall, engr. CD 8/23/44—ENR 9/7/44.

CONTRACTS AWARDED

California—State Div. Hys., Sacramento, bridge 4.5 mi. Sacramento Co., to M. A. Jenkins, 3560 Broadway, Sacramento. $74,295. Bids 9/18. (**Correction**—contractor and cost). CD 9/23—ENR 9/26, under LB.

O., Cincinnati—City, grade crossing elimination with Baltimore & Ohio R. R. at Hartwell Ave., to Vest & Bartell, 4438 Appleton St., $170,617. Est. $170,000. CD 11/21/44—ENR 12/14/44.

Okla., Tulsa—Tulsa Co., Shell Creek bridge in Tulsa Co. road sys., to Standard Paving Co., 2119 E. 11 St., $49,682. Est. $42,000. Awarded 12/2. G. Straughn, Court House, engr.

STREETS AND ROADS

BIDS ASKED

Bids Asked January 3

New York—Bureau Contrs. & Accounts, Albany, N. Y., soil exploration and foundation

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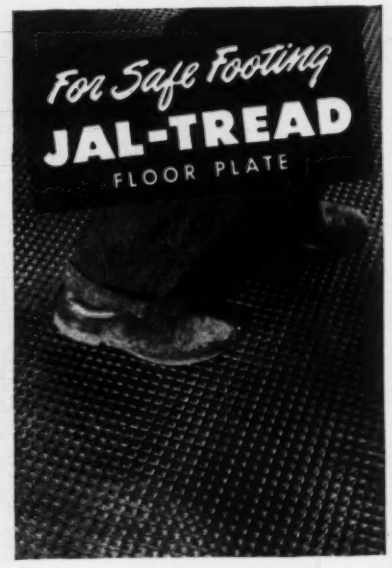

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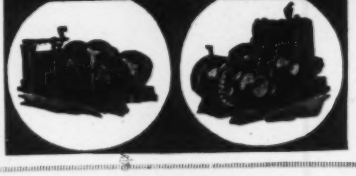

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STREETS AND ROADS (Bids Asked, Cont'd.)

investigations preliminary to reconstruction 11 mi. sect. Route 52 between Woodbourne and Ellenville, Ulster and Sullivan Counties.

N. Y., Kew Gardens—Queens Boro, Queens Boro Hall, 120-55 Queens Blvd., Zone 15, regulating, grading, constr. grade separation structures, retaining walls, sewer and drainage facilities, etc. in connecting Hy. from 39 Ave. to approx. 100 ft. north of 32 Ave. Plans deposit $35. Extended date. CD 11/29—ENR 12/5.

Bids Asked January 7

Ill., Springfield—City, City Hall, repaving Walnut St. between Mason St. and Elliott Ave. $70,000. Plans deposit $5. Lewis Lash, City Hall, city engr. CD 1/10—ENR 1/24 46.

Kansas—State Hy. Dpt., Wichita, resurfacing materials, 17.586 mi. Proj. 5740, Barber Co.; 8.935 mi. Proj. 5741, Butler Co.; 9.454 mi. Proj. 5742, Cowley Co.; 7.2 mi. Proj. 5544, Kingman Co.; 6.32 mi. Proj. 5743, Rush Co.; 6.089 mi. Proj. 5943, 1.164 mi. Proj. 5744, both Summer Co. R. C. Keeling, Topeka, engr.

Bids Asked January 9

Florida — State Rd. Dpt., Tallahassee, asphaltic concrete on 6 in. hot mix sand asphalt surfacing, small drainage structures, etc. 4.348 mi. State Rd. 10, between intersection of Rds. 10 and 20 and Ochlockonee River, F. A. P. FI-131 (7), Job 5506-209, Leon Co., $190,000; clearing, grubbing, grading, constructing sand bituminous road mix pavement, etc. 10.781 mi. Rd. 78, between Lakeport and Indiana Prairie Canal, S. P. Job 0502-106, Glades Co., $200,000; 6-in. R.B.S.T. pavement 20 ft. wide, one 195 ft. concrete bridge, one 22 ft. box culvert bridge, small drainage structures, etc. 6.003 mi. State Rd. 125, between point 5 mi. north of Glen St. Mary and point 6.003 mi. north, F. A. S. P. S-175 (1), Job 2704-201, Baker Co., $240,000. H. P. Coloney, state hy. engr.

Florida—State Rd. Dpt., Tallahassee, widening, reconstructing drainage structures Rd. 200, between Starke and Baldwin, S.P. Jobs 2801-110, 7103-103 and 7214-108, Clay and Duval Counties. Extended date. CD 12/2—ENR 12/5.

Kansas—State Hy. Dpt., Ottawa, resurfacing materials, 7.04 mi. Proj. 4597; 12.143 mi. Proj. 4596, both Anderson Co.; 3.01 mi. Proj. 4598, 10.996 mi. Proj. 4599, both Bourbon Co.; 17.99 mi. Proj. 4601, 11.274 mi. Proj. 4600, both Coffey Co.; 6.767 mi. Proj. 4602; 1.162 mi. Proj. 4603; 11.62 mi. Proj. 4856, all foregoing Franklin Co.; 12.121 mi. Proj. 4604, 5.8 mi. Proj. 4858, both Miami Co.; 7.7 mi. Proj. 4857, Neosho Co.; grading, 1.571 mi. Proj. S-418 (3), Elk Co.; 3.955 mi. Proj. S-218 (2), Franklin Co.; 3.943 mi. Proj. S-651 (1), Miami Co.; light type surfacing 1.571 mi. Proj. S-418 (3), Elk Co.; grading, light type surfacing 0.257 mi. Proj. K-4246, Coffey Co. R. C. Keeling, Topeka, engr.

Bids Asked January 15

California—State Div. Hys., Sacramento, grading, placing plant mix surfacing 5 mi. between 12 mi. east of Mojave and Muroc junction, Kern Co.; 0.4 mi. Stockton St. between Solinsky and Washington Sts., in Sonora, Tuolumne Co. G. T. McCoy, Sacramento, state hy. engr.

Bids Asked January 16

California—State Div. Hys., State Bldg., Los Angeles, grading, plant mix surfacing 4.9 mi. road between Laguna Beach and Dana Point, Orange Co.; grading, concrete paving, plant mix surfacing 3.4 mi. between Montalvo and Ventura, Ventura Co. G. T. McCoy, Sacramento, state hy. engr.

†**Virginia**—Pub. Rds. Admin., 1440 Columbia Pike, Arlington, Proj. 1PQ7- R8, constructing Blue Ridge Parkway, Floyd, Franklin and Patrick Counties. Plans deposit $10.

LOW BIDDERS

California—State Div. Hys., 808 State Bldg., Los Angeles, Dec. 12, imprv. 11.2 mi. Orange Co., from Griffith Co., 1060 S. Broadway, Los Angeles. **$241,258.** CD 11/12—ENR 11/14.

Calif., San Mateo—City, City Hall, imprv. streets in Dore and Cavanaugh Subdivisions, Spec. 46-12, from Edward Keeble & F. H. Brown, Box 669, **$122,654;** streets in Rollings Hills, Juniper Hills and Charles Subdivisions, Spec. 46-19, from L. C. Smith, First and Railroad Sts., San Mateo, **$72,790.**

Connecticut—State, W. F. Cox, comr., Hartford, Dec. 16, imprv. 16,966 ft. Colchester and Lebanon, from D. Arrigoni, 605 Main St., Middletown. **$133,029.** CD 12/4—ENR 12/12.

Florida—State Hy. Dpt., Tallahassee, Dec. 12, imprv. 0.762 mi. Volusia Co., from L. J. & W. L. Cobb, Inc., 1102 N. 22 St., Tampa, **$275,719***** 8.035 mi. Jefferson Co., from Coggin & Deermont, Chipley, **$78,016***** 2.164 mi. Putnam Co., from Langston-Hubbard Constr., Orlando, **$66,206.** CD 11/26—ENR 12/5.

Michigan—State Hy. Dpt., Lansing, Dec. 3, imprv. 5.987 mi. and 4.947 mi. Chippewa Co., from I. L. Whitehead, Pickford, **$170,122** and **$208,570** respectively*** 5.329 mi. Chippewa Co., from Wilmer Pierson, 2236 Deleware Blvd., Saginaw, **$158,848***** 4.795 mi. Mackinac Co., from Alpine Constr. Co., St. Ignace, Bid 2. **$135,526.** CD 11/27.

Michigan—State Hy. Dpt., Lansing, Dec. 4, imprv. 5.274 mi. Monroe Co., from W. R. Knapp, Box 593, Monroe, **$291,037***** 1.97 mi. Kalamazoo Co., from W. J. Muehlenbeck, Hess and Sheridan Sts., Saginaw, **$44,564***** 5.859 mi. Charlevoix Co., from L. W. Edison, 924 Floral Dr. S.E., Grand Rapids, **$268,638***** 4.374 mi. Arenac Co., and 2.365 mi. Lake and Osceola Counties, from Wilmer Pierson, 2236 Deleware Blvd., Saginaw, **$244,331** and **$200,277** respectively. CD 11/27.

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STREETS AND ROADS (Low Bidders, Cont'd.)

Michigan—State Hy. Dpt., Kalamazoo, Dec. 13, grading, drainage, concrete base course, bituminous binder course, bituminous concrete resurface course 0.189 mi. U. S. 12 from Kalamazoo Ave. to King Hy., U. 1-39-30, C-3, Kalamazoo Co., from The Globe Constr. Co., 462 Portage St., Kalamazoo. **$64,315.**

Montana—State Hy. Comn., Helena, rejected bids Dec. 10, imprv. 3.3 mi. Carbon Co., L. B. **$70,906**; 2.7 mi. Cascade Co., L. B. **$246,444**; 22 mi. Valley Co., L. B. **$246,828**; 6.5 mi. Park Co., L. B. **$139,612.** CD 11/8—ENR 11/14.

Ohio—State Hy. Dpt., Columbus, rejected bids Dec. 12, imprv. 0.473 mi. Erie Co., L. B. **$26,791**; 0.35 mi. Champaign Co., L. B. **$13,976.** CD 12/3—ENR 12/5.

★**Pennsylvania**—State Hy. Dpt., Harrisburg, rejected bids Nov. 22, imprv. 25,582 ft. Huntingdon Co., L. B. **$2,347,190**; 43,507 ft. Wayne Co., L. B. **$868,031**; 2,123 ft. Luzerne Co., L. B. **$63,253**; 3,030 ft. Westmoreland Co., L. B. **$188,647**; 1,301 ft. Beaver Co., L. B. **$73,781**; 715 ft. Beaver Co., L. B. **$62,127.** Will readvertise. CD 11/26—ENR 12/5, under LB.

South Dakota—State Hy. Dpt., Pierre, imprv. 12.882 mi. Tripp Co., from H. F. Emme Constr. Co., Rapid City. **$107,331.** CD 12/3.

Tennessee—State Hy. Dpt., Nashville, rejected bids Dec. 6, imprv. 7.721 mi. Blount Co., L. B. **$101,498.** CD 12/12—ENR 12/19.

Tex., Weimar—Colorado Co., H. Buescher, judge, project abandoned, road imprvs., paving. **$350,000.** CD 11/18—ENR 11/28.

SOON LETS CONTRACT

Calif., Woodland—Ford Shaffer & Son, 701 Main St., 20,000 ft. curbing, guttering, sidewalks in South Land Park Dist., to Stolte, Inc., 8451 San Leandro St., Oakland. Est. **$40,000.**

Montana—State Hy. Comn., Helena, imprv. 7.9 mi. Big Timber Co., to Peter Kiewit Sons Co., Box 875, Sheridan, Wyo. **$161,739.** Est. $130,000. Bids 12/10. CD 11/8—ENR 11/14.

CONTRACTS AWARDED

Michigan—State Hy. Dpt., Lansing, imprv. 0.747 mi. Wayne Co., to Julius Porath & Son Co., 702 Transportation Bldg., Detroit, **$80,555**; 1.122 mi. Wayne Co., to Denton Constr. Co., 7-170 General Motors Bldg., Detroit, **$85,734.** Bids 12/4. CD 11/27.

Montana—State Hy. Comn., Helena, imprv. 6.6 mi. Prairie Co., and 7.5 mi. Petroleum Co., to A. LaLonde Co., Box 71, Sidney, **$81,382**, est. $70,000 and **$95,976**, est. $120,000 respectively***4.8 mi. Powell Co., to McLaughlin, Inc., Ford Bldg., Great Falls, **$117,933**, est. $110,000***4.9 mi. Teton Co., to O'Neil Constr. Co., Box 1252, Havre, **$58,181**, est. $54,000*** 4.9 mi. Yellowstone Co., to S. H. Arkwright, Inc., Billings, **$102,918**, est. $96,000***19.6 mi. Hill Co., to Nilson-Smith Constr. Co., 812 2 St. S., Great Falls, **$196,548**, est. $96,000***5.5 mi. Mullen Rd., Missoula Co., to C. Shannon & Son, 302 S. Washington St., Butte, **$257,302**, est. $260,000. Grand total $910,240. Bids 12/10. CD 11/8—ENR 11/14.

O., Cincinnati—City, asphaltic concrete resurfacing Cleves Pike from Glenway to corporation line and 8 ft. concrete strips on each side, to O'Connell & Sweeney, Kellogg and Tennyson Aves., **$58,194.** Est. $60,000, H. H. Kranz, city engr. CD 3/8—ENR 3/21.

Okla., Oklahoma City — City, grading, asphaltic concrete paving Street Imprvt. Dist. 1061, to Earl W. Baker & Co., Bethany, **$109,537.** Est. $112,000. Awarded 12/12. CD 11/7—ENR 11/28.

Tex., Kingsville—Kleberg Co., c/o Ben F. Wilson, judge, imprv. 12.66 mi. roads, to Heidenfels Bros., 2202 Lipan St., Corpus Christi, **$99,013.** Est. $160,000. Bids 12/9. CD 11/19—ENR 11/21.

Tex., Richardson—E. D. Wallace, Richardson, grading, drainage, paving streets. Owner builds. Approx. **$88,000.**

EARTHWORK, WATERWAYS

BIDS ASKED

Bids Asked January 8

†**Arkansas**—U. S. Eng., P.O. Box 97, Memphis 1, Tenn., ditch excav. and bridge construction, Mississippi Co. Drainage Dist. 17, Serial No. 40-041-47-70.

Bids Asked January 14

†**Arkansas**—U. S. Eng., P. O. Box 60, Vicksburg, Miss., channel snagging, channel enlargement and realignment and channel cut-off in Terre Noire Creek, 10 mi. south of Arkadelphia, Clark Co.

Bids Asked January 16

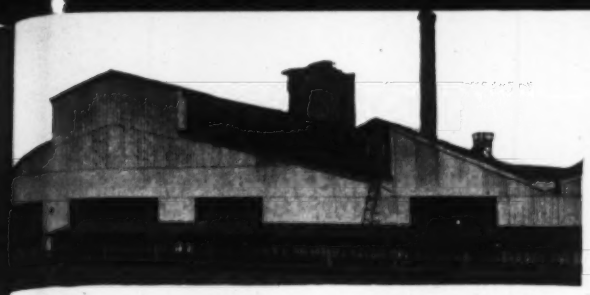
†**California**—U. S. Eng., Wright Bldg., Sacramento, constructing West Levee, Feather River from opposite Rio Bonito Station upstream 3.5 mi., Butte Co. Spec. 1248.

Bids Asked January 23

†**Idaho** — Bureau Reclamation, Denver, Colo., furnishing, del. f.o.b. cars shipping point or f.o.b. cars Cascade, structural steel, not incl. machine and anchor bolts, for access bridge at inlet structure of outlet works at Cascade Dam, Payette Div., Boise Proj., Spec. 1615. W. R. Young, ch. engr.

Bids Asked February 3

†**T. H., Hilo**—U. S. Eng., Fort Armstrong, Honolulu, reconstructing breakwater, Serial 414-47-8.



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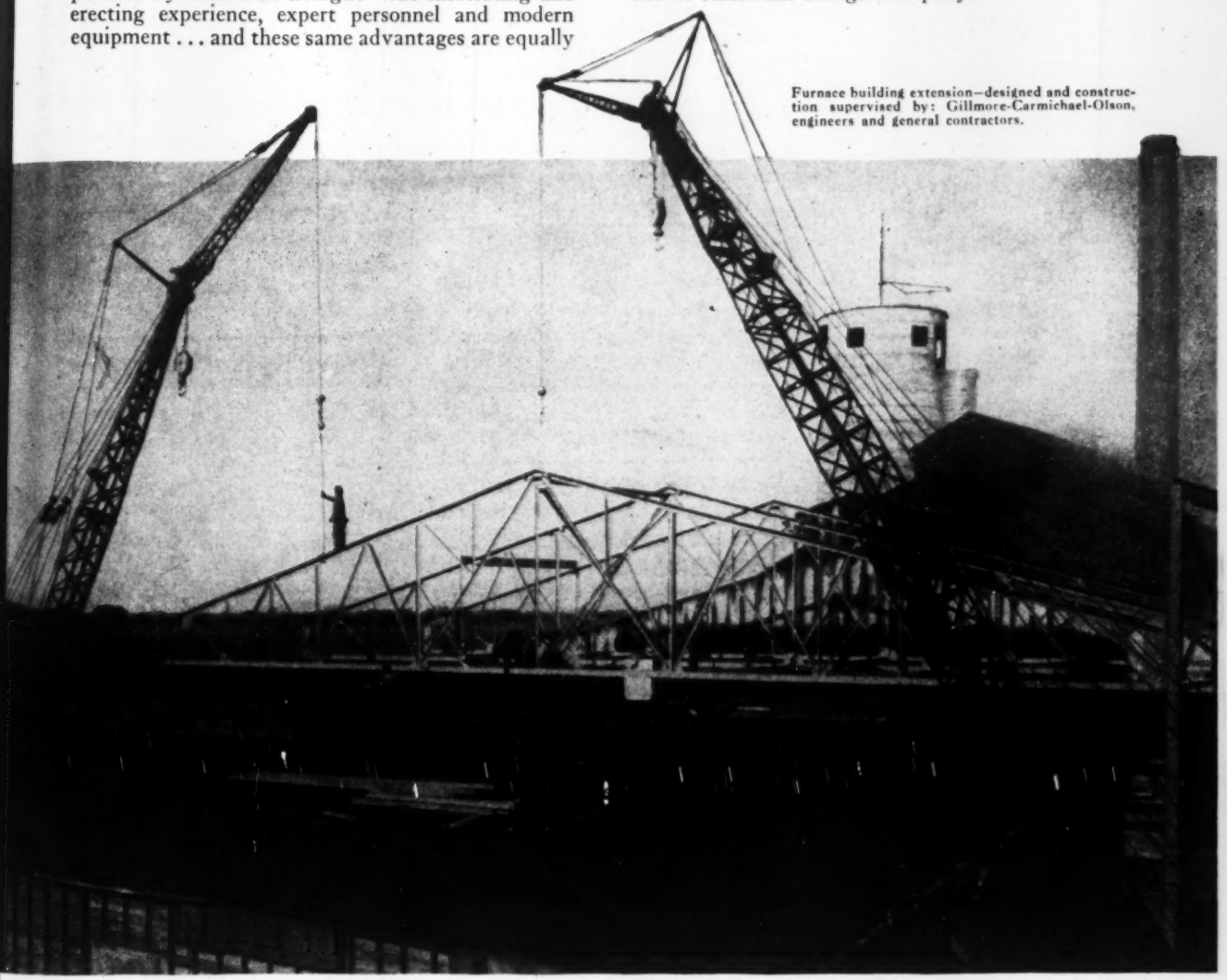

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EARTHWORK, WATERWAYS (Low Bidders, Cont'd.)

LOW BIDDERS

Tex., Waco—City, project abandoned, flood control of Brazos River. Over **$100,000.** CD 6/2/44—ENR 6/5/44.

CONTRACTS AWARDED

†**California**—Bureau Reclamation, Redding, Dec. 12, Penstocks Nos. 1, 2 and 5, Shasta Dam, Kennett Div., Central Valley Proj., Spec. 1514, from Eichleay Engr. Corp., 33 S. 19 St., Pittsburgh, Pa. **$448,800.** CD 12/3.

†**California** — Bureau Reclamation, Denver, Colo., cement for Delta-Mendota Canal, Spec. No. A-49, 103A, to Calaveras Cement Co., 315 Montgomery St., San Francisco. **$440,000.**

†**Montana**—Bureau Reclamation, Kalispell, rejected bids Aug. 19, clearing part of Hungry Horse Dam reservoir site, Spec. 1429. L. B. **$398,100.** CD 8/29—ENR 9/5, under LB.

†**Washington**—Dpt. Bureau Reclamation, Yakima, rejected bids Aug. 12, constr. Pump Area 15, lateral distr. sys., Roza Div., Yakima Proj., Spec. 1436. L. B. **$114,120.** Will readvertise. CD 8/20—ENR 8/22, under LB.

†**Wyoming**—Bureau Reclamation, Denver, Colo., transformers, lightning arresters, circuit breakers, etc., for Medicine Bow and Hanna Sub-stations, Kendrick Proj., Schedules 1, 3, 4 and 11 and spare parts, to General Electric Corp., 650, 17 St., Denver, Colo., **$32,301**; Schedule 8 and Items 15 to 21, Schedule 9, to Electric Power & Equip. Corp., Swanson and Shunk Sts., Phila, Pa., **$6,218**; Schedules 2, 7, 10 and 12, to Westinghouse Electric Corp., G. & E. Bldg., Denver, Colo., **$18,239**; Schedule 6, to Allis Chalmers Mfg. Co., 1126 S. 70 St., Milwaukee, Wis., **$11,224.** Grand total $67,982. CD 9/9—ENR 9/12.

AIRPORTS & AIRBASES

BIDS ASKED

Bids Asked After January 1

Tex., Dallas—TERMINAL—City, terminal bldg. addn. at Love Flying Field. $155,000. Plans deposit $25. Broad & Nelson, Burt Bldg., archts. CD 12/13/45—ENR 12/27/45.

Tex., Irving—HANGARS, etc.—C. D. Wyche, 5823 Harry Hines Blvd., Dallas, central hangar, $80,000; asphalt paving addnl. runways, $150,000; shop-type hangar and 10 addnl. storage hangars, $125,000; shop and fueling sys. $75,000. CD 9/9—ENR 9/19.

AMERICANS ABROAD

India—Lowey Constr. Co. (Hydropress, Inc.) 570 Lexington Ave., New York 22, N. Y., will construct metal work and rolling mill installation.

PUBLIC BUILDINGS

BIDS ASKED

Bids Asked December 30

†**N. Y., Buffalo**—Federal Works Agency, 731 Custom House, New York, Zone 4, miscellaneous repairs at post office.

Bids Asked January 3

N. Y., Astoria—New York City Housing Auth., 122 E. 42 St., New York, Zone 17, demolition structures, bldgs., etc. known as 92 St. ferryhouses, slips, Astoria Ave., Contr. 4-A (Proj. NYS 24) Astoria Houses. Plans deposit $10. Extended date.

Bids Asked January 6

Minn., Alexandria—City, H. S. Campbell, clk., furnishing, installing 1,600 hp. Diesel engine, etc. at municipal power plant, **$150,000.** Pfeifer & Shultz, 702 Wesley Temple Bldg., Minneapolis, engrs. CD 10/22—ENR 10/24.

Bids Asked January 7

Ala., Birmingham—City and Jefferson Co., 231 N. 19 St., 7 story public health bldg. $500,000. CD 12/9—ENR 12/12.

Bids Asked January 9

†**N. Y., Liberty**—Federal Works Agency, 731 Custom House, New York, Zone 4, miscellaneous repairs at post office.

Bids Asked January 13

N. Y., Forest Hills—Supt. School Bldgs., Design & Constr. 49 Flatbush Ave., Brooklyn, general constr., plumbing, drainage, heating, ventilating, electric and lighting fixture work for P.S. 157 (and work in connection therewith) 102 St., 63 Dr., Yellowstone Blvd. and 64 Ave. CD 2/7/44—ENR 2/24/44.

Bids Asked January 14

Ala., Albertville—Alabama State Market Bd., Montgomery, poultry and egg processing plant. $75,000.

Ala., Montgomery—Alabama State Market Bd., Montgomery, poultry and egg processing plant. $75,000.

Bids Asked January 15

N. C., Siler City—Bd. Trustees, Chatham Hospital, Inc., City Hall, 3 story, part bsmt. hospital. Eric G. Flannagan, Henderson, archt. CD 3/23/5—ENR 4/5/45.

Bids Asked January 20

Calif., Tracy—Tracy Community Memorial, Mrs. Horstkorta, secy., Tracy Inn Bldg., 1 story, 40 bed brick veneer, hospital, concrete fdn. $300,000. Plans deposit $25. F. L. Swartz & W. G. Hyberg, Roswell Bldg., Fresno, archts. CD 1/14—ENR 3/7.

LOW BIDDERS

D. C., Wash.—Distr. Comn., District Bldg., rejected bids Nov. 18, 1 story office at D. C. Property Yard, Montana and New York Aves. L.B. **$19,230.** CD 10/31—ENR 11/7.

D. C., Wash.—Distr. Comrs., District Bldg. rejected bids Nov. 21, Anacostia High School Addn. L.B. **$124,807.** CD 11/12—ENR 11/14.

Ill., Melrose Park—School Dist. 83, Dec. 12, general contract 2 story, rein.-con. school from Lafferty Great Lakes Co., 25 E. Jackson Blvd., Chicago, **$309,693,** heating and ventilating, from Builders Lighting Constr., 5155 N. Ashland St., Chicago, **$52,930;** general contract 1 story school, from J. J. Duffy Co., 176 W. Adams St., Chicago, **$150,870.** CD 11/29—ENR 12/5.

★**N. Y., New York**—New York City Housing Auth., 122 E. 42 St., Zone 17, project indefinitely postponed, Lillian Wald Houses, Housing N. Y.-5-2. **$12,000,000.** CD 12/16—ENR 12/19.

Pa., Altoona—City, City Hall, contract cancelled for channel bottom, C.A. **$73,984.** CD 9/11—ENR 9/19, under CA.

CONTRACTS AWARDED

Ont., Bancroft — North Hastings High School Dist., R. W. Hillis, secy., 1 story, 60x247 ft. high school with extension, 78x94 ft. and 32x44 ft., to M. Sullivan & Son, Ltd., Arnprior, about **$250,000.** Abra, Balharrie & Shore, 55 Metcalfe St., Ottawa, archts.

Ont., Hamilton—Bd. Educ., L. T. Spaulding, bus. administrator, City Hall, Queensdale School addn., to Olmsted and Parker, 63 John St. S. Approx. **$215,400.** Bids 12/9. G. T. Evans, 513 Pigott Bldg., archt. CD 11/26.

COMMERCIAL BUILDINGS

LOW BIDDERS

Tex., Austin—I & Nat Goodfriend, 716 Congress St., rejected bids Nov. 25, commercial bldg. L. B. **$126,789.** CD 11/19—ENR 11/21.

★**Tex., Dallas**—J. A. Crow, 8100 Garland St., project abandoned 500 small residences. **$1,750,000.** CD 7/19—ENR 8/8.

Tex., Raymondville—W. W. Ely & Assoc., Brownsville, project abandoned, 6 story hotel and stores bldg. **$205,000.** CD 8/23/45—ENR 9/6/45.

Tex., Pharr—Mrs. S. Jensen & Assoc., Pharr, project abandoned, hotel and stores. **$250,000.** CD 8/23/45—ENR 9/6/45.

CONTRACTS AWARDED

Calif., Concord—George C. Goheen, Sycamore and Highway Sts., Mill Valley, 68 residences in Avon Acres 2A. Owner builds. **$340,000.**

Conn., Bridgeport—J. A. Henriques, 1713 Myrtle Ave., single homes, Westfield Ave. Owner builds. Over **$205,000.**

Conn., Hamden — Giordano Brothers, 288 Main St., Branford, 28 brick, masonry housing units, Morse and Goodrich Sts., Owner builds. **$225,000.**

Del., Claymont—Stephen R. Jackson & Co., 810 Orange St., Wilmington residential development, separate contracts. **$240,000.**

Fla., Miami—Mangham & Butler, 3128 Coral Way, Fla., 25 addnl. houses, Woodridge Rd., own forces. Over **$205,000.**

Ga., Atlanta—W. S. Benfield, 1412 Epworth St. S.W., 120 houses various sections of city, own forces. Over **$205,000.**

Ga., Atlanta—J. Neal Bennett, 38 New Buford Hy., 80 houses various locations of city, own forces. Over **$205,000.**

Ga., Atlanta—E. A. Isakson, Rhodes-Haverty Bldg., 89 apartment units, own forces. Over **$205,000.**

Ga., Atlanta—W. E. Kirkland Co., 1128 Cascade Ave. S.W., 100 houses various sections of city, own forces. Over **$205,000.**

Ga., Atlanta—Max Kuniansky, 1015 Piedmont Ave. N.E., 80 houses, own forces. Over **$205,000.**

Ga., Atlanta—J. N. Malone, 391 E. Wesley Rd. N.E., 100 houses various sections of city, own forces. Over **$205,000.**

Ga., Atlanta—B. A. Martin Co., Haas-Howell Bldg., 200 houses various sections of city, own forces. Over **$205,000.**

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COMMERCIAL BLDGS. (Contracts Awarded, Cont'd.)

Ga., Atlanta—Nichols Contg. Co., 1190 Caroline St. S.E., 100 houses, various sections of city, own forces. Over **$205,000.**

Ga., Atlanta—Francis Shoup, 217 W. Ponce DeLeon Ave., Decatur, 100 houses various locations of city, own forces. Over **$205,000.**

Ga., Atlanta—Solloway Realty Co., 1086 Briarcliff Rd. N.E., 100 apartment units, own forces. Over **$205,000.**

Ga., East Point—King constr. Co., Inc., 102 Jefferson Ave., 80 houses, own forces. Over **$205,000.**

Miss., Holly Springs—Rust College, Holly Springs, dormitory and administration bldg., to Seth E. Giem, 166 Monroe Ave., Memphis, Tenn. Est. **$250,000.** CD 11/14—ENR 11/21.

Mo., Kansas City—St. Lukes Hospital Assn., c/o A. W. Peet, 44 and Wornall Rd., general contract hospital addn., to Long Constr. Co., Rialton Bldg. Est. **$260,000.** Keene & Simpson, Land Bank Bldg., archts.

★**N. J., Camden**—N. J. Bell Telephone Co., 540 Broad St., Newark, central office bldg., to Mahony-Troast Constr. Co., 657 Main Ave., Passaic. **$1,000,000.** Voorhees, Walker, Foley & Smith, 101 Park Ave., New York, N. Y., engrs. and archts.

★**N. J., Cookstown**—Sarah Graber, New Egypt, residential development, awarded 12/11 to V. E. Havens, New Egypt. **$1,000,000.**

N. J., Burlington—Owner, c/o L. E. Goettleman, archt., 483 Loucroft Ave., Haddonfield, residential development, separate contracts. Over **$205,000.**

★**N. J., Mays Landing**—Lake Risley Lumber Co., 4 W. West Jersey Ave., Pleasantville, residential development, separate contracts. **$1,000,000.**

N. J., Mount Holly—L. C. Bock & Sons, 148 E. Madison St., residential development, separate contracts. **$400,000.**

N. J., Pennsauken—Browning Road Development Co., 312 Market St., Camden, residential development, separate contracts. **$220,000.** H. E. Hall, 840 Cooper St., Camden, archt.

N. Y., Brooklyn—Linden Development Co., A. Kramer, pres., 401 Broadway, New York, Zone 13, 17 two-family houses Autumn Ave. Owner builds. **$229,550.** CD 11/15—ENR 11/28.

N. Y., Flushing—Metropolitan Home Builders, c/o Samuel S. Paul, archt., 163-18 Jamaica Ave., Jamaica, forty-one 2 story 1-family houses, 26 Ave. 160 and 163 Sts. Owner builds. **$287,000.** CD 10/9—ENR 10/24.

N. Y., Queens Village—Queens Estates, c/o Alwin Cassens Jr., archt., 92-32 Union Hall St., Jamaica, 34 one family houses, 249 St. 81 Ave., Union Turnpike. Owner builds. **$289,000.** CD 10/9—ENR 10/24.

Pa., Conshohocken—Leon Swetkowski, 195 Moorehead Ave., West Conshohocken, residential development, separate contracts. Over **$205,000.**

Pa., Lebanon—Jacob Kreider R. D. 4, residential development, separate contracts. Over **$205,000.**

Pa., Mifflin Twp.—Carnegie Illinois Steel Corp., Carnegie Bldg., 5 Ave., Pittsburgh, 1 story, steel office bldg. addn. at Iron Works, to The Austin Co., Euclid Ave., East Cleveland, O. Est. **$208,000.** M. W. Reed & R. F. Burnatt, Carnegie Bldg., 5 Ave., Pittsburgh, engrs.

Pa., Norristown—Hartranft Corp., c/o Norristown Penn Trust Co., Maia and Swede Sts., residential development, separate contracts. **$350,000.** CD 4/22—ENR 4/25.

Pa., Phila.—Asheville Corp., 13 St. and Medary Ave., residential development, separate contracts. **$220,000.** Christian H. Fries, 3701 N. Broad St., archt.

Pa., Phila.—Frank Kiely, 611 Arbutus St., residential development, separate contracts. **$375,000.** Christian H. Fries, 3701 N. Broad St., archt.

Pa., Phila.—Northeast Constructors, Craig and Stanwood Sts., residential development, separate contracts. Over **$205,000.**

Pa., Spring City—Associated Builders, 111 N. Main St., residential development, separate contracts. Over **$205,00.**

Pa., Upper Moreland Twp. (Bridgeport P. O.)—Owner c/o Francis Jobson, archt., R. F. D. 2, Wayne, residential development, separate contracts. **$600,000.**

R. I., Cranston—John Montaquillo Estates, 266 Oaklawn Ave., 40 frame homes Dean Estates, to Thomas Ciccone Co., 266 Oaklawn Ave. Est. **$375,000.** Thomas Russillo, 433 Westminister St., Providence, archt.

R. I., East Providence—Samuel Bornes, 14 Millers Ave., Providence, 2 story, bsmnt., brick, steel theater, Warren and Pawtucket Aves. Owner builds. **$210,000.** CD 11/25—ENR 12/5.

★**Tex., Corpus Christi**—Sam E. Wilson, Jr., Driscoll Bldg., resort, constructing 25,000 lin. ft. causeway from mainland south of Corpus Christi to Gulf beach at Mustang Island, double lane paving across top causeway, hydraulic fill for causeway, 2,124 lin. ft. bridges across the Laguna, to Brown & Root, Inc., 1501 Musset St., approx. **$1,000,000.** Nat. W. Hardy, 59 County Club Pl., engr. CD 11/21/45 ENR 12/6/45.

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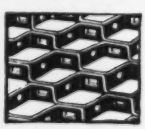

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COMMERCIAL BLDGS. (Contracts Awarded, Cont'd.)

B. C., Vancouver—British Colombia Motor Transportation Ltd., 570 Dunsmuir St., developing Larwill Park into bus terminals and streamlined loading area, to Dominion Constr. Co. Ltd., 150 W. First Ave. Approx. **$300,000.**

Que., Cap de la Madeleine—Rev. Sisters of Jesus, 1193 Blvd. St. Louis, normal school, to A. W. Rosseau, 100 du Sanctuaire St. Approx. **$500,000.** E. L. Denoncourt, 1425 Notre Dame St., Three Rivers, archt. CD 8/15—ENR 11/28.

INDUSTRIAL BUILDINGS

BIDS ASKED

Bids After January 1

N. J., Salem—FACTORY—Anchor-Hocking Glass Co., 83 Griffith St., factory. $100,000.

★**Tex., Houston**—REFINERY PLANT—Eastern State Petroleum Co., Inc., Ship Channel, refinery plant. $3,500,000.

Bids Asked January 7

Miss., Walnut—PLANT—Tippah Co., Courthouse Bldg., Ripley, garment plant. $100,000. Bids 9/3 rejected. N. W. Overstreet & Assoc., 901 N. Lamar St., Jackson, archts. CD 8/20—ENR 8/22.

Bids Asked January 8

Calif., Cucamonga—WINERY—Masi Brothers, Cucamonga, 1 story, winery on Hy. 66, near here. Over $55,000. Mellin & Harnish, 311 D St., San Bernardino, archts.

Bids Asked January 15

N. C., Charlotte—PLANT—J. N. Pease & Co., engr., 119½ E. 5 St., newspaper plant for Charlotte Observer, 600 S. Tryon St.

★**Pa., Phila.** — PRODUCE TERMINAL — Charles E. Oelschlager, archt., Produce Exchange Bldg., 3 and Walnut Sts., wholesale produce terminal for Phila Wholesale Produce Corp., c/o Emerson D. Curtis, 3 and Walnut Sts. $6,500,000. CD 8/21—ENR 8/19.

Pa., Swissvale—BOTTLING PLANT—Regent Square Bottling Works, 1204 S. Braddock Ave., Pittsburgh, 2 story, 100x172 ft. concrete, concrete block bottling plant. $70,000. W. H. Young, Duncan St., Washington, archt. CD 3/19—ENR 3/21.

R. I., Providence — BOILER PLANT—United Electric Rys., Co., 24 Exchange Pl., boiler plant, incl. steel bunker 20 ft. high, extensive alterations, Elmwood Ave. $70,000. CD 12/5—ENR 12/12.

★**Tex., Houston**—PLANT—Rohm & Haas, 222 W. Washington Sq., Phila., Pa., chemical plant, $3,000,000; warehouse or storage, $250,000. CD 12/11—ENR 12/19.

Tex., Port Arthur—STORAGE, etc.—P. H. Inman, Port Arthur, auto mechanical repair shop and service bldg. parts storage. CD 7/26—ENR 8/1.

SOON LETS CONTRACT

Ala., Birmingham—GARAGE—Liberty Motors, Inc., 2501 16 Ave S., soon lets contract automobile repair garage. $75,000. E. B. Van Keuren & C. F. Davis, Martin Bldg., archts.

Mich., Detroit — WAREHOUSE, etc.—Giffels & Vallet, archts., 1000 Marquette Bldg., soon let contract, brick, concrete, frame warehouse and lumber show room, for Mohawk Lumber Co., 14525 W. Chicago St. $75,000.

Pa., Jeannette—WAREHOUSE—Penn Rubber Co., Jeannette, soon lets contract 3 story, 245x180 ft., brick, rein.-con. warehouse. $250,000.

Pa., Phila—PLANT—E. I. du Pont de Nemours Co., du Pont Bldg., Wilmington, Del., soon lets contract plant addn. Over $150,000. CD 12/6—ENR 12/12.

LOW BIDDERS

Calif., San Rafael—PLANT—H. C. Little Burner Co., 2 and Lincoln Sts., Dec. 13, 1 story, wood frame, siding mfg. plant, from E. P. Merritt, 102 Rialto Bldg., San Francisco. **$181,810.** H. M. O'Neill Co., 610 16 St., Oakland, engr.

Fla., Miami Beach—SERVICE STATION, etc.—Miami Beach Railway Co., Miami Beach, service station and offices, from Witters Constr. Co., 1745 S. W. 6 St., Miami. Est. **$100,000.**

R. I., Providence — WAREHOUSE — Merchants Cold Storage & Warehouse Co., 160 Kinsley Ave., rejected bids brick, steel warehouse addns., alterations. **$100,000.** CD 10/17—ENR 10/24.

Tex., Dallas—FACTORY—Ruberoid Co., c/o Walter G. Cowan, 500 Fifth Ave., New York, N. Y., and Stanley Woodward, vice pres., 500 S. Ponca St., Baltimore, Md., contract rescinded, constructing plant mfg. asphalt and asbestos cement roofing, CA. Approx. **$875,000.** CD 7/2—ENR 7/11, under CA.

W. Va., Wheeling—BAKERY—P. J. Gast & Son, 36 E. Eoff St., 1 story, concrete block, rein.-con. bakery, from The Byrum Constr. Co., 24—14 St. Est. **$75,000.** CD 11/27—ENR 12/5.

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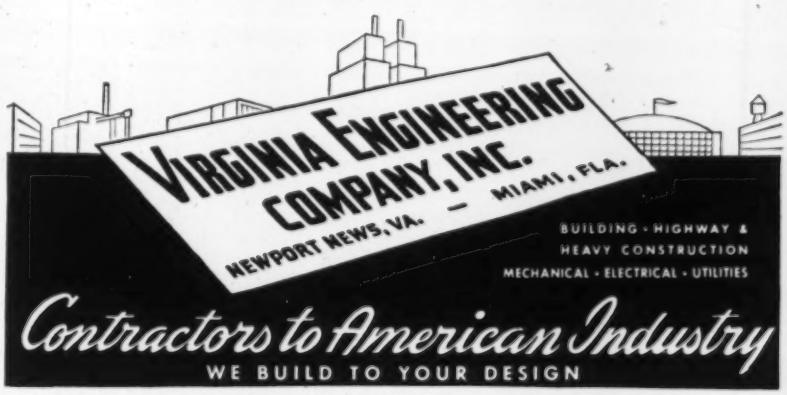
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INDUSTRIAL BLDGS. (Contracts Awarded, Cont'd.)

CONTRACTS AWARDED

Calif., Riverbank — PLANT — Riverbank Canning Co., Riverbank, 2 story, rein.-con., steel cannery plant, to M. A. Little, 1 Grand View Ave., San Francisco. Est. **$100,000.** Donald Powers Smith, 58 Sutter St., San Francisco, archt. CD 11/13—ENR 11/21.

Fla., Jacksonville—WAREHOUSE—City & Co., Stockton St., food storage warehouse, to R. J. Gallespie, 2219 Park St. Est. **$85,000.**

Fla., Miami—PLANT—Brewer Asphalt Co., c/o C. C. Patterson, 230 Salamon Ave., Coral Gables, 1 story, concrete block asphalt plant, own forces. **$70,000.** W. H. Merriam, 1022 Malaga Ave., archt.

Ia., Eagle Grove—PLANT—Consumer Co-operative Assn., 310 E. 10 St., Kansas City, Mo., fertilizer mfg. plant, Owner builds. **$100,000.**

Ga., Bolton — POWER PLANT — Georgia Power Co., 75 Marietta St. N. W., Atlanta, concrete sub-structure for Power Plant Atkinson, to Gilbert Beers, 542 Plum St., Atlanta. **$270,000.**

Ga., Lagrange—PLANT—Troup Co-operatives Dairy, Lagrange, dairy plant, to Daniel Lumber Co., agrange. Est. **$85,000.** Ivey & Crook, Palmer Bldg., Atlanta, archts.

★**Ill., Peoria**—PANT—Caterpillar Tractor Co., 600 W. Washington St., 1 story, 790x1,180 ft. brick, steel superstructure engine plant, to S. N. Nielsen Co., 3059 W. Augusta Blvd., Chicago. Est. **$8,000,000.** Giffels & Vallet, Marquette Bldg., Detroit, Mich., archts.

Mo., Kansas City—PRINTING PLANT OFFICE—Methodist Publishing Co., 1021 McGee St., general contract office, to Swenson Constr. Co., 3305 Terrace St., Kansas City. Est. **$220,000.** Neville & Sharp, Midland Bldg., archts.

N. J., Camden — FACTORY — Stonecrete Corp., 509 Market St., mfg. bldg., warehouse and office bldg., to Costanza Contg. Corp., 5328 Sherwood Terrace, Merchantville. **$100,000.** Awarded 12/9. Radey & MacNelly, 101 N. 7 St., archts.

★**N. J., Hamilton Twp. (Trenton P. O.)**—FACTORY—Sloane Blabon Corp., Bear Swamp Rd., Trenton, design and construction mfg., office and plastics bldgs., to W. Kidde Constructors Inc., 140 Cedar St., New York, N. Y. Est. **$1,373,000.**

★**N. J., North Bergen**—FACTORY—Grand City Container Corp., 622 W. 57 St., New York 19, N. Y., general contract paper product mfg. factory, Tonnelle Ave., to S. S. Silberblatt, Inc., 25 W. 45 St., New York 19, N. Y. Est. **$2,000,000.** S. Brian Baylinson, 26 W. 58 St., New York, N. Y., consult. archt. CD 3/21—ENR 4/4.

N. J., Salem—LOADING PLATFORM—Anchor-Hocking Glass Corp., 83 Griffith St., loading platform and leanto, to Foundations & Excavation, Inc., 61 E. Main St., Moorestown. Over **$55,000.** CD 9/11—ENR 9/17.

O., Cincinnati — PLANT — French Bros.-Bauer Co., 1020 Plum St., milk plant addn., South Central Parkway, to Ferro Concrete Constr. Co., 203 W. Third St. Est. **$55,000.**

Pa., Jeannette—FACTORY—American Window Glass Corp., 1073 S. Main St., 1 story, bsmnt., 40x60 ft., rein.-con., block, steel frame glass factory addn., to Groomes Constr. Co., Highland and Spruce Sts., Cheswick. Est. **$53,000.**

Pa., Norristown — MILL—Edwin & Lewis Bry., Inc., DeKalb St., 2 story, brick or block mill addn., to Frank R. Heavner, Montgomery Trust Arcade. Over **$55,000.** Awarded 12/11. Lacy-Atherton, Wilson & Davis, Hotel Sterling, Wilkes-Barre, archt.

Pa., Phila.—LAUNDRY—King Laundry Co., 11 and Emily Sts., laundry bldg. addns., alterations, to Edward H. Kelley, 2021 Market St. Est. **$73,000.** Awarded 12/22. Louis A. Manfredi, 2228 Mifflin St., archt. CD 11/27—ENR 12/5.

Pa., Phila. — WAREHOUSE, etc. — Samuel Schultz, 2104 N. Front St., 2 story, bsmnt., 37x109 ft., brick, structural steel warehouse and store, to S. Yellin & Son, Inc., 222 N. 11 St. Over **$55,000.** Awarded 12/10. Lewis J. Cowan, Colonial Bldg., archt.

Pa., Pittsburgh—MILL—Crucible Steel Co. of America, Oliver Bldg., remodeling 3 mill bldgs., replacing steel sash roofing and siding, to H. H. Robertson Co., Farmers Bank Bldg., **$60,000**; constructing 1 story 75x75x52 ft. and 1 story, 75x51x17 ft. mill bldg. addns., separate contracts, **$87,000.**

Pa., Pittsburgh—FACTORY—E. H. Rousseau, 2101 Broadhead Fording Rd., 1 story, 200x300 ft., concrete block, brick, structural steel frame factory, own forces. **$80,000.** S. L' R. Rousseau, Arrott Bldg., archt.

Pa., Ruffs Dale—DISTILLERY—Dillinger Distillers, Inc., Ruffs Dale, 2- 2½- 3 story concrete block, brick, steel frame distillery addn., to Groomes Constr. Co., Highland and Spruce St. Cheswick. Est. **$100,000.**

Pa., Sharon—FACTORY—Rite Form Corset Co., 635 6 Ave., New York, N. Y., 3 story, bsmnt, 80x200 ft. factory remodeling alterations, to Paul Gleun, 17 S. Dock St., Pittsburgh. Est. **$60,000.**

Pa., Wheatland — PLANT — Gustave Paul, Wheatland, 1 story, 60x80 ft. cement block plant, to Paul W. Gleun, 17 S. Dock St., Sharon. Est. **$80,000.**

R. I., Ashaway—FACTORY—Ashaway Line & Twine Co., A. J. Crandall, pres., 2 story, bsmt., 60x120 ft., brick, cinder block factory, to Walter G. Eggleston, Ashaway. Est. **$55,000.**

Tex., Henderson—PLANT—Henderson Clay Products, Henderson, clay products mfg. plant. Owner builds. **$115,000.** CD 8/9—ENR 8/15.

Ont., Carleton Place — PLANT — Imperial Oil Ltd., 30 Church St., Toronto, propane gas plant on 2 acre site, storage and distr. plant, pumphouse, tanks, etc., to M. J. Sulphur & Sons, Renfrew. Est. **$100,C00.**

★**Que., Arvida**—LEAD SMELTER—Quebec Lead Smelting Syndicate, J. C. Dunlap, mgr., c/o Ventures, Ltd., 25 King St. W., Toronto, Ont., lead smelter, separate contracts. About **$1,000,000.**

UNCLASSIFIED

BIDS ASKED

Bids Asked January 3

N. Y., Brooklyn—PLAYGROUND—Comr. Parks, at office Dpt. Parks, Arsenal Bldg., Central Park, 64 St. and 5 Ave., New York, Zone 21, Linden Playground, north of Stanley Ave. and east of Vermont St., Brooklyn Boro, Contr. BG-11900-146. Plans deposit $20.

Bids Asked January 15

Calif., San Jose—SPRINKLER SYSTEM—State Div. Hys., P. Wks. Bldg., Sacramento, furnishing, installing sprinkler sys. and 0.5 mi. plant highway, on Bayshore Freeway at Santa Clara St. underpass in Santa Clara Co. G. T. McCoy, Sacramento state hy. engr.

LOW BIDDERS

Pa., Phila.—ELEVATED STATION—Phila. Dpt. City Transit, City Hall Annex, and Phila. Transportation Co., Mitten Bldg., Frankford Elevated line, (Highspeed) Margaret—Orthodox Station, constructing passenger loading platforms, track work, incl. steel, concrete, electrical work, etc., from Golder Constr. Co., Market St., National Bank Bldg., lump sum **$215,659.** Est. $233,400. CD 12/5—ENR 12/12.

New York—SWITCHBOARDS, etc.—Triborough Bridge & Tunnel Auth., at Engineer's Office Bldg., 10 State St., New York, Zone 4, mfg., del. electrical switchboards and panels with equip., appurtenances for Brooklyn-Battery Tunnel, from General Electric Co., River Rd., Schenectady. **$990,912.** CD 12/10—ENR 12/12.

CONTRACTS AWARDED

Mo., St. Louis—RADIO STATION IMPRVS.—Radio Station KSD, c/o Pulitzer Publishing Co., Post-Dispatch Bldg., 12 Blvd. at Olive St., Zone 1, transmitting plant and antenna sys. for KSD, incl. four 450 ft. high steel towers, studios and offices, and remodeling first, second and mezzanine floors of Post-Dispatch Bldg., to Austin & Co., 16112 Euclid Ave., Cleveland, O. Est. **$500,000.**

Tex., Dallas—RAILWAY TRACK—Chicago, Rock Island & Pacific Ry. Co., 118 Field St., railway track switching sys., force account. **$90,000.**

Tex., Dallas—RAILWAY TRACKS—Dallas Railway & Terminal Co., Interurban Bldg., rebuilding portions street car railway tracks, **$275,000;** and removal tracks and replacing paving, **$80,000**, own forces. CD 8/14—ENR 9/5.

PROPOSED PROJECTS

Including class of projects previously listed as *postwar*

INDUSTRIAL BUILDINGS

PROPOSED WORK

Calif., Los Angeles—PLANT, etc.—Minnesota Mining & Mfg. Co., 900 Farquier Ave., St. Paul, Minn., and 631 S. Anderson St., 1 story, rein.-con. rubber-cement plant, and 1 story, 50x100 ft. rein.-con. mixing plant, Garfield Ave. and Randolph St. **$130,000.**

Calif., Los Angeles.—WAREHOUSE—Roscoe Hardware Co., 8165 San Fernando Rd., Roscoe, Los Angeles, plans by F. E. Brewster, 17350 Ludlow St., 3 story, 82x169 ft. rein.-con. brick warehouse, San Fernando Rd. near Lankershim Blvd., Roscoe, Los Angeles. Over **$150,000.** Chapman, Michky, Stoddard & Krause Corp., 6410 Van Nuys Blvd., Van Nuys, consult. engr.

Calif., Martinez — PLANT — Shell Development Co., 100 Bush St., San Francisco, plans under way, 1 story, structural steel or transite insecticide plant. **$650,000.**

Calif., Oakland—MOTOR COACH SERVICE—Railway Equipment & Realty Co., 1106 Broadway, plans under way, motor coach service bldg. **$184,000.**

Calif., San Francisco—PLANT—Kilpatrick Bakery Co., 2030 Folsom St., plans under way, Class C rein.-con., frame plant addn. **$190,000.** H. M. Engle, 110 Sutter St., consult. engr.

Calif., San Francisco—PLANT—Rath Packing Co., Waterloo, Ia., altering meat packing plant. **$390,000.**

Calif., Stockton—PLANT—Fibreboard Products Co., Inc., 1709 Montgomery St., San Francisco, 1 story, bsmnt., rein.-con. industrial plant addn. **$408,460.** L. S. Rosener, 233 Sansome St., San Francisco, consult. engr.

Colo., Denver—SALES and SERVICE—Gates Rubber Co., 1331-41 Court Pl., plans by Raymond H. Ervin, Patterson Bldg., Zone, 1 and 2 story, 150x125 ft. rein.-con. sales and service bldg. **$150,000.**

Conn., East Hartford—PLANT—First National Stores, Oakland Ave., plans by Ganteaume & McMullen, 99 Chauncy St., Boston, Mass., 4 story, brick, steel bakery plant addn. **$125,000.** Financing provided. CD 8/2/44—ENR 8/24/44.

Del., Milford—PLANT—L. D. Caulk Co., Milford, plant. **$100,000.** Financing provided.

Fla., Jacksonville — GARAGE, etc. — Jax Brewing Co., 1429 W. 16 St., plans by Abner C. Hopkins, 409 W. Adams St., garage and addnl. remodeling brewing plant. **$150,000.** CD 4/3—ENR 5/2.

Fla., Panama City—FACTORY—J. G. Scherf, Andalusia, Ala., plans by Carl B. Cooper, Bell Bldg., Montgomery, Ala., shirt factory, **$125,000.**

★**Ga., Atlanta**—WAREHOUSE, etc.—Eastman Kodak Co., 343 State St., Rochester, N. Y., plans by Cooper, Bond & Cooper, Henry Grady Bldg., warehouse and sales office, **$1,000,000.** Financing provided.

Ill., Chicago—FACTORY—Kent Products, 222 W. Monroe St., plans by Sidney Finck, 134 N. LaSalle St., 1 story brick, steel, concrete factory. **$200,000.**

★**Ill., Venice** — GENERATING PLANT—Union Electric Co. of Missouri, J. W. McAfee, pres., Union Electric Bldg., 305 N. 12 Blvd., St. Louis, 1, Mo., rein.-con., brick, steel steam power generating plant. **$10,000,000.**

Ia., Clear Lake—BOTTLING PLANT—Tom Cain, Clear Lake, bottling plant. **$100,000.**

★**Md., Baltimore**—PLANT—Mutual Chemical Co., 1348 Block St., preliminary studies by Sanderson & Porter, engrs.-archts., 52 William St., New York, N. Y., rehabilitation mfg. plant. **$1,000,000.** CD 3/29.

Mass., Woburn — WAREHOUSE — Atlantic Gelatine Co., Woburn, plans completed, 1 story, brick, steel warehouse. **$128,532.**

Mich., Grand Rapids—FACTORY—Vanderley Bros., Waters Bldg., plans 10% completed by J. & G. Daverman Co., Keeler Bldg., brick, steel, concrete furniture factory addn. **$100,000.**

★**Mo., Kansas City**—LABORATORY—Mid-West Research Institute, c/o G. E. Ziegler, 4449 Pennsylvania St., plans by Wight & Wight, First Natl. Bank Bldg., research laboratory. **$1,000,000.**

Mo., North Kansas City — TRUCK TERMINAL—Riss & Co., c/o L. L. Stearns, 124 W. 4 St., Kansas City, Mo., plans by Gentry & Voskamp, Midland Theater Bldg., Kansas City, Mo., truck terminal. **$1,000,000.**

★**Neb., Omaha**—PLANT—Food Fair Stores, Inc., 2223 E. Allegheny Ave., Phila., Pa., meat packing plant. **$1,500,000.**

N. Y., Corning—PLANT—New York State Electric & Gas Corp., 62 Henry St., Binghamton, electric generating plant. **$900,000.** Gilbert Assoc. Inc., 412 Washington St., Reading, Pa., consult. engr.

N. Y., Flushing — WAREHOUSE — Maida Holding Corp., 224-65 W. Main St., plans completed department store warehouse. **$140,000.** Financing provided.

N. Y., Long Island City—FACTORY—Philip Sievering, Inc., 199 Lafayette St., New York, Zone 12, plans completed by Harold Austin, c/o owner, 1 story factory, Hunters Point Ave. and Van Dam St. **$275,000.** Financing provided.

N. Y., New York—STORAGE—Atlas Supply Co., 112 Bruckner Blvd., Zone 54, plans completed bldg. for storage of bldg. materials at Botanical Sq. and Webster Ave. **$100,000.** Financing provided.

O., Norwalk—PLANT—Norwalk Food Processing, Inc., Norwalk, frozen food plant. **$240,000.** Financing provided.

★**Okla., Harrah**—STEAM TURBO GENERATOR—Oklahoma Gas & Electric Co., 321 N. Harvey St., Oklahoma City, plans 75% completed, 12,500 kw. steam turbo generator unit in Horse Shoe power plant near here. **$1,000,000.** Financing provided.

★**Okla., Ponca City**—STEAM TURBO GENERATOR—Oklahoma Gas & Electric Co., 321 N. Harvey St., Oklahoma City, plans 60% completed 20,000 kw. steam turbo-generator unit in Beerbower power plant, near here. **$1,500,000.** Financing provided.

Okla., Tulsa—LABORATORY—Carter Oil Co., 1133 N. Lewis St., plans 40% completed by A. M. Atkinson, 502 Thompson Bldg., research laboratory addns. **$225,000.** Financing provided.

Ore., Medford — WAREHOUSE — Rogue River Orchards Co., 1311 N. Central St., plans by R. J. Keeney, Central Ave., 2 story, 33x120 ft., rein.-con. cold storage warehouse addn. **$100,000.** Financing provided.

Proposal Advertisements see p. 128
Proposed Projects see p. 98

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OFFICIAL PROPOSALS

Official notices of bids wanted on construction and related work, equipment and material for government, state, municipal departments and private enterprises

RATE: *THE RATE FOR OFFICIAL PROPOSAL ADVERTISING IS 65 CENTS PER LINE (OR FRACTION) PER INSERTION*

COPY RECEIVED *UP TO 3:00 P. M. FRIDAY FOR ISSUE OUT THURSDAY OF THE FOLLOWING WEEK SUBJECT TO SPACE OPEN FOR LAST MINUTE ADS*

SEND COPY *TO OFFICIAL PROPOSAL DIVISION, ENGINEERING NEWS-RECORD, 330 W. 42ND ST., NEW YORK 18, N. Y.*

Bids: January 3, 1947 (352)

State Highway Work

STATE DEPARTMENT OF PUBLIC WORKS, ALBANY, N. Y.—Pursuant to the provisions of Chapter 63 Laws of 1936, and amendments thereto, sealed proposals will be received until two o'clock p.m., eastern standard time, on FRIDAY, JANUARY 3, 1947, by Mr. Henry A. Cohen, Director, Bureau of Contracts and Accounts, 14th. Floor, The Governor Alfred E. Smith State Office Building, Albany, N. Y. for

SOIL EXPLORATIONS AND FOUNDATION INVESTIGATIONS AT VARIOUS SITES ON THE WOODBOURNE-ELLENVILLE STATE HIGHWAY, PARTS 1, 2A, and 2B, ULSTER AND SULLIVAN COUNTIES, which constitutes CONTRACT No. SM-12.

Maps, plans, and specifications may be seen and obtained at the Bureau of Contracts and Accounts on the 14th. Floor, The Governor Alfred E. Smith State Office Building, Albany, N. Y., and also in the office of J. S. Bixby, District Engineer, Pleasant Valley Road, Poughkeepsie, N. Y.

The deposit for a set of plans, specifications and proposal forms is $5.00. A refund in full will be made to bidders for return of one set in good condition within 30 days of award or rejection of bids; refund for all other sets in good condition, similar period, will be 50% of deposit.

The Engineer's estimate of cost for this work is $21,100.00.

Proposal for this contract must be submitted in a separate sealed envelope with the name of the contract plainly endorsed on the outside of the envelope. Proposal must be accompanied by cash, draft or certified check, payable to the order of the "State of New York, Commissioner of Taxation and Finance" for the sum of $1,055.00. The retention and disposal of the bidding check, the execution of the contract and bonds shall conform to the provisions of the Highway Law, as set forth in "Instruction to Bidders."

Foreign contractors must furnish the required certificate as to the payment of taxes in Articles 9A and 16 of the Tax Law of the State of New York. Corporations submitting proposals shall be authorized to do business in the State of New York.

The right is reserved to reject any or all bids.

CHAS. H. SELLS
SUPT. OF PUBLIC WORKS

Bids: January 20, 1947 (351)

Furnishing & Installing Pumping Equipment

CITY OF POUGHKEEPSIE, NEW YORK
BOARD OF PUBLIC WORKS

Poughkeepsie, New York, December 16, 1946

Sealed proposals will be received by the Board of Public Works of the City of Poughkeepsie, until 3:00 P.M. January 20, 1947 for furnishing and installing pumping equipment. All bids received pursuant to this notice will be publicly opened and read.

Plans, specifications, form of proposal, bond and contract may be obtained at the office of the Superintendent, Board of Public Works, Poughkeepsie, N. Y., and at the office of Malcolm Pirnie Engineers, 25 West 43rd Street, New York, N. Y. A set of the plans, specifications and contract documents may be had for use in making up a bid by depositing Ten Dollars ($10.00). If a bid is submitted, the deposit will be refunded upon return of the plans and specifications. In case a bid is not submitted, Five Dollars ($5.00) of the deposit will be refunded upon return of the plans and specifications in good condition within two weeks after the date of receiving proposals.

Each proposal shall be accompanied by a certified check for five percent (5%) of the total amount of the proposal made payable to the order of the CITY OF POUGHKEEPSIE. The bidder to whom the contract is awarded will be required to furnish, for the faithful performance of the work under this contract, an approved Surety Company bond in the total amount of the contract awarded.

The right is reserved to reject any or all bids.

BOARD OF PUBLIC WORKS OF THE CITY OF POUGHKEEPSIE
By Walter J. Davis
Clerk

Delaware Manor Apartments

BUFFALO, N. Y.
(HOUSING PROJECT BIDS)

N. Y., BUFFALO—DELAWARE MANOR 15 STY RE-CONCRETE STRUCTURE 60 Apartments & Underground Garage—2 Elevators—Central HEATING PLANT, OWNERS FRED J. ROSS & WM. D. MAIER NEW CORP., 315 ERIE COUNTY BANK BUILDING & P. L. CIMINI, ARCHITECT, 500 MORGAN BLDG., CLEV. 7248, BUFFALO, N. Y. 700,000 C.Ft. without Garage Under base. 50,000 C.Ft. Est. PLANS & SPECIFICATIONS READY. (354)

Bids: January 3, 1947 (356)

Furnishing Water Pumping Unit

WASHINGTON SUBURBAN SANITARY COMMISSION
CONTRACT NO. 305-W

Sealed proposals for furnishing a water pumping unit having a capacity of 3,500 gallons per minute, will be received at the office of the Washington Suburban Sanitary Commission, Hamilton Street, Hyattsville, Maryland until 11:15 A. M., Eastern Standard Time, Friday, January 3, 1947.

Plans and specifications may be obtained from Harry R. Hall, Chief Engineer of the Commission, Hyattsville, Maryland.

Perry Boswell
Lacy Shaw
Frank B. Smith
Commissioners

Bids: January 9, 1947 (357)

West-Southwest Sewage Treatment Works

THE SANITARY DISTRICT OF CHICAGO
DIVISION Qb.

To Contractors:

Sealed proposals, endorsed "PROPOSAL FOR WEST - SOUTHWEST SEWAGE TREATMENT WORKS, DIVISION Qb," will be received by the Clerk of The Sanitary District of Chicago at the office of said Sanitary District, Room 600, 910 South Michigan Avenue, Chicago, Illinois, until 1:30 P.M., Central Standard Time, on Thursday, January 9, 1947, and will be opened publicly by the Board of Trustees of said Sanitary District at a meeting to be held on that day or at the first meeting thereafter, prior notice of said subsequent meeting to be mailed to all bidders.

The work for which tenders are invited consists of furnishing, fabricating and delivering the structural steel required for the Extension of the Sludge Disposal Building on the east and southeast sides of the existing building. About 1,800,000 pounds will be required.

The site of the West-Southwest Sewage Treatment Works is situated immediately west of the Sanitary District's West Side Sewage Treatment Works, located west of South 52nd Avenue, south of West Pershing Road and north of the right of way of the Chicago and Illinois Western Railroad in the Village and Township of Stickney, County of Cook, State of Illinois.

All bids must be made upon blank forms of proposal furnished by the Sanitary District, and shall be made in accordance with and conform to all of the terms and conditions set forth in "Requirements for Bidding and Instructions to Bidders" attached thereto.

Specifications, form of proposal, paint booklet and general plans may be obtained at the office of said Sanitary District upon deposit of Ten Dollars ($10.00), which sum so deposited will be refunded if said plans and specifications are returned in good condition within thirty days following the opening of the bids.

Each proposal must be accompanied by cash or a cashier's check or a certified check on a responsible bank doing business in the City of Chicago, in the amount of Nine Thousand Dollars ($9,000.00) payable to the order of the Clerk of The Sanitary District of Chicago. Any proposal submitted without being accompanied by such cash or check will not be considered and will not be read after it is publicly opened.

The Board of Trustees of The Sanitary District of Chicago reserves the right to reject any or all proposals.

THE SANITARY DISTRICT OF CHICAGO,
By J. L. Friedman,
Chairman of Its Committee on Finance.

Attest:
Jas. J. Sullivan,
Clerk.
Chicago, December 20, 1946.

U. S. Government

U. S. Engineer Office, Huntington 18, West Virginia.—Sealed bids will be received here until 3 January 1947 for furnishing all plant, labor, materials and equipment and performing all work for reconstruction of Dam No. 7 Muskingum River, Ohio. Application for specifications and drawing should be made to this office. Copies are available for examination at U. S. Engineer Offices in cities of Cincinnati, St. Louis, Pittsburgh and Louisville. (333)

U. S. ENGINEER OFFICE, NORFOLK, VIRGINIA:—Sealed bids will be received here until 2:00 PM, EST, 7 January 1947, and then opened, for furnishing all plant, labor, materials, and performing all work for constructing the Access Highway from U. S. Highway 58 to Dam Site, Buggs Island Reservoir, Mecklenburg County, Virginia. Further information on application. (350)

UNITED STATES DEPARTMENT OF THE INTERIOR, Bureau of Reclamation, Denver, Colorado. Sealed bids (Specifications No. 1571) will be received by Bureau of Reclamation, Denver, until 2 p.m., January 7, 1947, and then publicly opened for furnishing and delivering a structural-steel cofferdam for maintenance of spillway apron at Shasta Dam. Delivery is desired within 300 days. For particulars, address the Bureau of Reclamation, Customhouse, Denver 2, Colorado; or Washington 25, D. C.

MICHAEL W. STRAUS,
Commissioner.
(355)

EARLIER CLOSING DATES

December 26 and January 2, 1947 Issues

Owing to the holidays, December 24, 25 and 31, and January 1, the Official Proposal pages of the above issues of Engineering News-Record will close for press 10 A.M. FRIDAY of the week *preceding* the date of issue (instead of Monday of the week of issue).

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PROPOSALS, 65 cents a line an insertion.

INFORMATION:
BOX NUMBERS care publication New York, Chicago or San Francisco offices count as 10 words additional in undisplayed ads.

DISCOUNT of 10% if full payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

DISPLAYED—RATE PER INCH:
The advertising rate is $9.00 per inch for all advertising appearing on other than a contract basis. Contract rates quoted on request.

AN ADVERTISING INCH is measured ⅞ inch vertically on one column, 3 columns—30 inches—to a page. E.N.R.

NEW ADVERTISEMENTS received by January 2nd appear in January 9th issue subject to limitation of space available.

WANTED

REFRIGERATION ENGINEER

We have an opportunity in our established offices located in Cleveland, Chicago, and Oakland, California, for a capable designing engineer, experienced in the layout and design of industrial refrigeration systems.

Give full particulars and remuneration expected in first letter.

THE AUSTIN COMPANY
National Headquarters
16112 Euclid Ave. Cleveland 12, Ohio

WANTED

CONSTRUCTION ASSISTANT CONSTRUCTION MANAGER

Engineering-Contracting Organization operating in domestic and foreign fields on oil refinery construction has opening for construction supervisor who has had responsible charge of large refinery projects and possesses well-rounded construction experience. Must be good organizer, able to handle labor and have executive ability. Compensation commensurate with ability of individual. Give full information regarding education, training, chronological details of experience, age, salary expected. All replies will be considered confidential.

P-172, Engineering News-Record
520 North Michigan Ave., Chicago 11, Ill.

WANTED

ENGINEER

experienced in the design of road and bridge plans. State qualifications, experience, salary and age. Specimens of own work preferred with reply.
BOARD OF CHOSEN FREEHOLDERS
County of Morris Court House
Morristown, New Jersey

WANTED

ENGINEER
ASSISTANT TO CITY MANAGER

Graduate Civil Engineer 25-35 years. Good salary plus substantial pension provision. Promotion for the right man. Some experience in municipal engineering desirable. Write

G. R. YOUNG, *Village Manager*
675 Vernon Avenue, Glencoe, Illinois

Wanted

CHIEF ENGINEER

Must be mechanical engineer with electrical experience.

For work at Guam, M. I.

POLLOCK-STOCKTON SHIPBUILDING Co.
717 MARKET STREET, ROOM 223
SAN FRANCISCO 3, CALIFORNIA

POSITIONS VACANT

WANTED—ENGINEERS experienced in the design of sewers, sewage treatment plants and water treatment plants. State qualifications, experience and salary requirements. P-787, Engineering News-Record, 330 W. 42nd St., New York 18, N. Y.

CONSTRUCTION SUPERINTENDENTS and Assistant Superintendents required by established engineering and construction firm with headquarters New York City for permanent position in constructing petroleum refining, chemical and power plant installation on large scale in U. S. A. and foreign service. In reply state prior experience and salary expected. P-220, Engineering News-Record, 330 W. 42nd St., New York 18, N. Y.

ENGINEERS, experienced in design of sewers, sewage treatment plants, water works. State qualifications, detailed experience, salary requirements, availability. Pennsylvania firm. P-222, Engineering News-Record, 330 W. 42nd St., New York 18, N. Y.

ESTIMATOR—STRUCTURAL & Orn. Shop, Norfolk, Va., 10 to 15 years. Responsible experience in take offs, pricing & selling. P-244, Engineering News-Record, 330 W. 42nd St., New York 18, N. Y.

CONSTRUCTION SUPERINTENDENT — Experienced on industrial and public buildings. Graduate engineer preferred. Work in Upper Peninsula of Michigan. Application should include complete record of past experience, education and salary required. P-235, Engineering News-Record, 520 N. Michigan Ave., Chicago 11, Ill.

CHECKERS AND detailers for shop drawings for fabricating shop. Top salaries for good men with experience. Some Over-time. State age, qualifications, salary, and how soon available. Empire Structural Steel Fabricators, Inc., Syracuse, New York.

MID-WEST Structural Shop, fabricating Bridge and Building Steel, has opening for experienced and capable Shop Superintendent. Permanent and splendid opportunity. In answering give age, complete details of experience, education, etc. P-270, Engineering News-Record, 520 N. Michigan Ave., Chicago 11, Ill.

ESTIMATOR—EXPERIENCED in Commercial and Industrial Construction. Free to travel. Must be close buyer, capable of subcontract preparation and excellent expeditor. One of the country's largest contractors. We want an absolutely top man and have best opportunity in the industry to offer. P-271, Engineering News-Record, 520 N. Michigan Ave., Chicago 11, Ill.

(Continued on page 130)

WANTED

MECHANICAL DRAFTSMEN

Experienced In

High and Low Pressure Piping
For Power Plants
and Industrial Plants
Also
Experienced Heating and Ventilating Draftsmen

WESTCOTT & MAPES, INC.
New Haven, Connecticut

WANTED

SUP'T AND FOREMAN

Experienced in road, sewer, and all type public utility construction in Metropolitan Area of New Jersey. Steady position. State age, experience and wage.

P-250, Engineering News-Record
330 West 42nd St., New York 18, N. Y.

DRAFTSMEN

DESIGNERS AND CHECKERS
with experience on
Structural Steel and Concrete
Process Piping
Pressure Vessels

The Boston office of E. B. Badger and Sons Co., internationally famous chemical engineering organization, offers qualified men well-paying positions. This is a fine opportunity for men who would enjoy working in congenial surroundings and with pleasant cooperative associates. A personal interview can be arranged in your city. This is not a temporary position. Write, giving full details of background and experience, salary wanted, etc., to

Mr. William M. Rose, Personnel Director
E. B. Badger and Sons Co.
75 Pitts Street, Boston, Mass.

MECHANICAL ENGINEERS DRAFTSMEN & SPECIALISTS

needed by expanding Engineering Department for projects involving building and equipment layouts, design of buildings, equipment and machinery for corn and soybean processing plant. Opportunity for permanent position with progressive company. Starting salaries upward of recognized professional levels depending upon qualifications. Retirement and other benefit plans. Location Decatur, Illinois.

Mechanical Engineers
must have equivalent of degree from accredited school and experience in related projects.

Draftsmen and Specialists
must have experience in structural, architectural, mechanical, civil, hydraulic, electrical or chemical engineering and design.

Send small photo, complete record of education, experience and starting salary requirements in first letter. All applications will be acknowledged.

Personnel Department

A. E. Staley Mfg. Co., Decatur, Ill.

(Additional Position Vacant Ads on page 130)

Wanted

CIVIL ENGINEERS
GRADE FOREMEN
BUILDING FOREMEN
TRACTOR MECHANICS
R. R. TRACK FOREMEN
ELECTRICAL ENGINEER

Young Men for work in Venezuela, S. A., on two years contract. Room and board furnished but no family accommodations. State age, experience, education, references, knowledge of Spanish and Salary expected. Send Photograph if possible.

P-983, Engineering News-Record
330 West 42nd St., New York 18, N. Y.

WANTED

CIVIL ENGINEER CONCRETE SPECIALIST

New York engineering organization specializing in Design and Construction of power plants and industrial structures desires employ engineer thoroughly experienced all phases use of concrete from specifications to manufacture and placing. Experience in grouting and in foundation problems desirable. Minimum age 45 years with at least 20 years office and field experience this line. Please send complete resume.

P-252, Engineering News-Record
330 West 42nd St., New York 18, N. Y.

WANTED

STRUCTURAL ENGINEER

For Design of Structural Steel and Reinforced Concrete Structures

WESTCOTT & MAPES, INC.
New Haven, Connecticut

WANTED IMMEDIATELY
EXPERIENCED

DESIGNING ENGINEERS
CIVIL, ELECTRICAL AND MECHANICAL
IN ALL GRADES for
LARGE SEWAGE DISPOSAL PROJECT
In East Bay Area

- **Work in Oakland, California**
- **Opportunity for Advancement**
- **40-hour Week**

East Bay Municipal Utility District
Apply Personnel Division Office
512 Sixteenth St., Oakland, Calif.

WANTED

PROJECT ENGINEER

Experience graduate Mechanical Engineer with knowledge of steam power plant design and equipment, capable consulting with principals and supervising general design of power plants. Must coordinate work of drafting room, purchasing and construction department and be responsible for complete projects from initial stages to completion of construction. Salary commensurate with experience. Location Pennsylvania with well established firm engineering contractors. Advise full particulars, age, education, experience.

P-269, Engineering News-Record
330 West 42nd St., New York 18, N. Y.

WANTED

Air Conditioning Engineer

We have a position open for a capable Mechanical Engineer, in several of our established offices.

Applicants must possess a sound knowledge of Air Conditioning and Ventilation Systems for industrial projects, and be qualified to layout, design, and prepare engineering drawings.

Give full particulars and remuneration expected in first letter.

THE AUSTIN COMPANY
National Headquarters
16112 Euclid Ave. Cleveland 12, Ohio

(Continued from page 129)

EMPLOYMENT SERVICE

EXECUTIVES AND Technical Men: Since 1915 thousands have used our confidential personal service with success in contacting employers for desirable positions. We handle all negotiations. Send experience record with inquiry. The National Business Bourse, 20 W. Jackson Blvd., Chicago 4.

POSITIONS WANTED

GENERAL CARPENTER Foreman Asst. Supt. —25 years experience specializing in all types concrete construction. Age 43. Available immediately. Location immaterial. PW-232, Engineering News-Record, 330 W. 42nd St., New York 18, N. Y.

CONSTRUCTION EXECUTIVE Engineer. Many years diversified experience in construction of all types. Take full responsibility of organization and operation of many large projects in his stride. Knows how to secure and expedite materials and get things done. Salary requirements $10,000 plus percentage of profits. With an eye to a partnership interest. PW-226, Engineering News-Record, 330 W. 42nd St., New York 18, N. Y.

SALES MANAGER or Branch Manager for Building or Metal Products, twenty years sales engineering and sales managerial experience with two leading companies. Now employed New York City desires change. PW-227, Engineering News-Record, 330 W. 42nd St., New York 18, N. Y.

CIVIL ENGINEER—structural age 42. Registered Penn. and Delaware. Early experience subway constructing. Recent experience mainly detailing and design of buildings with some bridges, piers and railroad layouts including four years overseas civilian design. Available immediately within Wilmington, Coatesville, Lancaster area. PW-229, Engineering News-Record, 330 W. 42nd St., New York 18, N. Y.

CONSTRUCTION ENGINEER over 25 years experience on subways, tunnels, bridges, cassions, shafts, grade eliminations, air fields, building roads, sewers, water works, grain elevators. Licensed professional engineer. Veteran, ex-Major, Corps of Engineers. PW-230, Engineering News-Record, 330 W. 42nd St., New York 18, N. Y.

CONSTRUCTION, SUPERINTENDENT: age 33. Small and medium size heavy construction projects. Assistant superintendent on large projects. Last 6 years specializing on water front construction. Timber, concrete and steel. Veteran of Sea Bees. B.S. in Civil Engineering degree. PW-248, Engineering News-Record, 330 W. 42nd St., New York 18, N. Y.

CONSTRUCTION SUPT.—Structural Engineer-Estimator. Age 44, 20 years experience dams, waterfront structures, parkways, roads, bridges, power plants, industrial buildings, wants position with small or medium size contracting organization with opportunity of obtaining interest in business. Present position, supervising Structural Engineer with large Consulting and Contracting firm. P.O. Box 164, Collingswood, N. J.

CEMENT MASON FOREMAN

15 Years' Experience

Familiar with mechanical floats and finishing machines. Can take off quantities and know cost. Will only consider large project. Just returned from South America. Willing to return to work in the States.

PW-236, Engineering News-Record
330 West 42nd St., New York 18, N. Y.

SALES-ENGINEER WANTED

To call on Engineers & Architects in New York City and follow up new industrial construction in East. The man we are looking for will have some engineering background; familiarity with chemical process industry; and industrial paint, construction or maintenance material sales experience. *Must be a sales-closer.* Good starting salary with young Company, owner-managed, leader in its field. Write fully in confidence to

SW-273, Engineering News-Record
330 West 42nd St., New York 18, N. Y.

Salaried Positions $2,500 $25,000

This thoroughly organized confidential service of 37 years' recognized standing and reputation carries on preliminary negotiations for supervisory, technical and executive positions of the calibre indicated. Retaining fee protected by refund provision. Identity covered and present position protected. Send only name and address for details.

R. W. BIXBY, INC. 272 Dun Bldg., Buffalo 2, N. Y.

POSITIONS WANTED

GENERAL CONSTRUCTION Superintendent, 43, married, graduate engineer, 19 years experience heavy construction, building dams, powerhouses, bridges, culverts. Drive all kinds pile-highway excavation and grading. Familiar with all kinds heavy equipment. Have full crew of foremen and master mechanic, all available January 1. No job too large or too small. PW-260, Engineering News-Record, 330 W. 42nd St., New York 18, N. Y.

CONSTRUCTION SUPERINTENDENT: Shaft Boss, experienced shaft and tunnel work also quarries and open cut rock work. PW-261, Engineering News-Record, 330 W. 42nd St., New York 18, N. Y.

GENERAL OR Concrete Foreman, 26 years experience complete charge of all types of concrete construction. Placing and handling batch and crushing plants. Member A.C.I. Foreign or domestic. PW-262, Engineering News-Record, 330 W. 42nd St., New York 18, N. Y.

SANITARY ENGINEER, 33, ten years experience civil and military construction and operation of plants for biological and chemical treatment of domestic wastes treatment and reclamation of industrial wastes. PW-265, Engineering News-Record, 330 W. 42nd St., New York 18, N. Y.

STRUCTURAL ENGINEER. Young. B.C.E. Registered P.E. New York and Ohio, six years experience in design, construction, and estimates, experienced on Rigid Frames, heavy foundations, difficult structures. Desires responsible designing position with progressive Architectural or Engineering firm. PW-268, Engineering News-Record, 330 W. 42nd St., New York 28, N. Y.

STRUCTURAL DESIGN Engineer, Grad. C.E. Age 44, 22 years experience designing steel, concrete and timber structures. Good analyst rigid frames, and difficult foundations. Thoroughly competent to execute complete design and working drawings on any type of building or water front structure. PW-238, Engineering News-Record, 68 Post Street, San Francisco 4, Cal.

SUPERINTENDENT: 25 years heavy construction experience. Bridges, dams, disposal plants, water front work, sewers, water, heavy excavation concrete structures, etc., know men and equipment, good organizer, immediately, and location. PW-247, Engineering News-Record, 330 W. 42nd St., New York 18, N. Y.

(Continued on page 131)

POSITIONS WANTED

VETERANS Completing intensive training in old established school need work opportunities in Mechanical, Architectural or Electrical Drafting. What can they do for you?

Please Inquire:

MONDELL INSTITUTE
1425 Broadway, New York 18, New York
Wisconsin 7-2143
129 Montague St., Brooklyn 2, New York
Main 5-2741
Licensed by State of New York—Approved for Vets.

A COURSE OF INSTRUCTION BY MAIL IN
STRUCTURAL ENGINEERING
Thirty-seventh Year

(In the following list, Courses A, B, and C are abbreviated from our complete Structural Engineering course).
A—Public Works Structures.
B—Architectural Engineering.
C—Special Course (State Board Exams for P.E.)
D—Structural Engineering (complete).
E—Preparatory Course for non-technical men).

Our Courses are offered principally to
ADULT CIVIL ENGINEERS AND ARCHITECTS

Ninety percent of our engineering students are former graduates (C.E.) from engineering colleges. Our courses have helped thousands of engineers to better positions, increased pay, and success "after forty".

Course B has helped many architects and draftsmen in passing the structural portion of State Board Examinations for license.
Literature sent without expense or obligation. Write TODAY.

WILSON ENGINEERING CORPORATION
College House Offices Harvard Square Cambridge, Mass., U. S. A.

POSITIONS WANTED
(Continued from opposite page)

STRUCTURAL ENGINEER wishes to join staff of a South American engineering or architectural firm. M.I.T. graduate. Experienced as engineer among architects; office and field supervision; good training in analysis of indeterminate structures; excellent knowledge of modern methods and materials. PW-272, Engineering News-Record, 330 W. 42nd St., New York 18, N. Y.

PART TIME WORK WANTED

STRUCTURAL STEEL Shop Drawings. Industrial building plans. Concrete design, by Registered Engineers. Georgia Detailers Association, Box 191, East Point, Ga.

EXPERT STRUCTURAL Engineer, P.E., steel and reinforced concrete industrial and other buildings. PTWW-266, Engineering News-Record, 330 W. 42nd St., New York 18, N. Y.

WORK WANTED

ORGANIZATION of 10 designer draftsmen available for your requirements in structural steel, concrete, heating, plumbing, piping of all kinds. WW-242, Engineering News-Record, 330 W. 42nd St., New York 18, N. Y.

ACCURATE RATIOED Enlargements from Aero Film. Also scaled copies enlarged or reduced. H. M. White Surveys, 24 Commerce Lane, Rockville, Maryland.

SELLING OPPORTUNITIES OFFERED

CONSTRUCTION SALES Lines Wanted for S. C. building materials and building equipment. Civil Engineer, 5 years sales experience in this territory. P. O. Box 1441, Columbia, S. C.

SALESMEN. OPENING for experienced construction machinery salesmen in organization of a leading distributor in St. Louis area. Liberal salary and commission arrangement with definite territory. State qualifications and experience. All replies will be treated in confidence. Rozier-Ryan Company, 3340 Morganford, St. Louis, Missouri.

FOR RENT

TRANSITS $21 per month, Levels & Planetable $14 per month. Daniel McFarland, 624 Second Ave., San Francisco, Calif.

WANTED

TRANSIT and LEVELS—accurately repaired also bought, sold or rented, quickly, first class service. Griner, 903 Grand Ave., Kansas City, Mo.

PATENT ATTORNEY

PATENT AND Trade-Mark Practice before U. S. Patent Office. Validity and Infringement Investigations and Opinions. Booklet and form "Evidence of Conception" forwarded upon request. Lancaster, Allwine & Rommel, Registered Patent Attorneys, Suite 454, 815-15th Street, N.W., Washington 5, D. C.

Top Line Engineer
30 Years Experience
DESIGN & CONSTRUCTION
offers
New York Representation
Construction & Equipment Items
Fully qualified. Highest References
Box 1337; 1474 Broadway, N.Y.

DETAILING
Shop Drawings For Buildings, Conveyors, Towers & Tipples Made & Checked.
Good Work—Adequate Speed—Can Handle Up to 150 ton Job
ASSOCIATED DETAILERS
417 Lee St., Bristol, Va.

Certified Inspection of Heavy Construction Equipment by Experienced Engineers
HODGE & HAMMOND, INC.
1162 Grinnell Place
New York 59, N. Y.
DAyton 9-5300

PAINT — $1.00 gallon
Packed in 5 gal. cans 20,000 gals. available
Anti-fouling, boat bottom, maroon-red, cold plastic—M1 Formula 105
Minimum quantities 100 gals.
F.O.B. Warehouse
J. C. NOWAK & BROS.
318 Meadow St. Willimansett, Mass.

ACCURATE TYPE
LENSMATIC POCKET COMPASS
Prism Sight Worth $7.50
Glass Cover $1.65 ea.
Sight Vane 2 for $3.00
Jeweled Center With Case
J. JACOB SHANNON & CO.
214 N. 22nd St. Phila. 3, Pa.
"The Oldest Equipment House in Philadelphia"

LEARN TO ESTIMATE

Today, more than ever before, you must know how to analyze building costs. If you want to become a successful builder, learn how to prepare a correct estimate in a hurry. Get in on the profitable work now available wherever you turn. Your success is assured if your estimates are right; otherwise you are licked before you start.

The Tamblyn System of Estimating will make a real estimator out of you in a few weeks of your spare time. We are so sure that you will want to learn it, that we will send you our complete home study course for ten days examination absolutely free. If you don't think it is the finest thing you ever saw, just return it and it won't cost you a cent. If you like it and want it, send us five dollars a month until you have paid the total price of only thirty dollars.

This estimating system is based on forty years of actual construction experience. It has been sold all over the world for more than twenty years. Thousands of estimators and contractors swear by it. Our offer isn't hot air and big talk. We don't give you a diploma or a lapel button, but we do teach you down to earth estimating which will bring you profitable business.

Just send us your name and address today, and we will mail you the complete course at once for your approval.

TAMBLYN SYSTEM
210 Johnson Bldg., EA,
Denver 2, Colo.

INSTRUCTION IN HIGHWAY ENGINEERING
Home Study *By Mail Only*
Learn by Solving Actual Highway Problems Progressively and Intelligently Presented
Prepare for Advancement
Write for Literature Now
SCHOOL OF HIGHWAY PRACTICE
2161 Shattuck Ave., Berkeley 4, Calif.

FOR SALE
CONCRETE MIXER
1935 Rex Concrete Mixer—190 cu. ft. drum, mounted on 1931 Mack, with 6 cyl. Waukeshaw engine. Make offer.
CONCRETE CARRIERS, INC.
Harrison, New Jersey
HA-6-4496

EXPORT SERVICE
HEAVY MACHINERY and EQUIPMENT
Complete facilities dismantling, packing, trucking and forwarding. Plant includes large storage area, heavy cranes, winch trucks and trailers carrying up to 100-ton loads. We have packed over 5 Billion Dollars worth of equipment in last five years.
For immediate service wire — write — call
DADE BROTHERS INC.
MINEOLA, L. I., N. Y. Tel. Garden City 3880

STEEL BUILDING
FOR SALE
Brand New
Phone or wire your inquiries
ECONOMY CO., INC.
49 Vanderbilt Ave., N. Y. 17, N. Y.

SHOVELS, CRANES, DRAGLINES

New 54 B Buc-Erie Diesel crane.
Osgood Dragline 1½ yds. diesel.
Northwest 25 Crane-Shovel-Dragline ¾ yd.
Northwest 35 Crane, 1 yd.
Lima 101, Shovel-Crane, gas, 1¼ yds.
Buc-Erie 50B Diesel dragline 2½ yds.
Bucyrus-Erie 52B 2 yd. shov-drag elec.
P&H Model 775 1¾ yd. crane.
P&H Model 600 1 yd. crane 50' boom.
Page Diesel Dragline, 3 yds.
P&H 400 crane ¾ yd. 40 ft. boom.
Marion Model 350 Shovel- ¾ yds. elec.
Marion 490 2¼ yd., electric shovel.
Byers Model 55—¾ yd. Crane.
Koehring 301 Crane-Shovel-Backhoe, ¾ yd.
Browning ⅝ yd. crane 35 ft. boom.
Buckeye ⅜ yd. crane shovel backhoe.
Shovel Front for Lorain 55 crane.

TRUCKCRANES

Lorain 55 on 10-wheel Mack, 15 tons.
Marion 15 ton on 10 wheel Army chassis.
Universal 7½ ton on 10 wheel truck.
Universal 7½ ton on 6 wheel truck.
Hansen ⅝ yd. shovel-crane.
Universal 7½ tons on 6 wheels, Mack.

TRACTORS—BULLDOZERS—SCRAPERS

TD18 Tractor with Buc-Erie S90 Scraper, 10-11 Buc-Erie cable Bulldozer.
Al-Chal Model HD 10 W pusher block and 10 yard La Pante Cheate cable scraper.
Cat. D 8 with LeTourneau Power Control
Cat. D 4 tractor with Angledozer.
Cat. D-7 Tractor with Bulldozer.
Cat. D-6 Tractor with Angledozer.
Int. TD18 tractor with bulldozer.
Int. TD 35 with bulldozer, rebuilt.
Int. T 35 with bulldozer.
Cat RD 6 with Bulldozer.
D4 Tractor with Trackson Pipe Layer.
Int. TD 40 Tractor with Bulldozer.
Al-Chal 8 with bulldozer, wide cats.
LeTourneau RU 17 cu. yd. carry-all.
LeTourneau 12 cu. yd. Carry-All scraper.

LOCOMOTIVES & CARS

American 50 ton, Saddle Tank Switcher.
Mack 60 ton Diesel elec. loco St. ga.
Vulcan 25 ton side tank steam loco.
Vulcan 30 ton, Saddle Tank, steam.
Vulcan 6 ton, 36" gauge, gas.
Porter 12 ton, 36" gauge, steam.
Baldwin 25 ton Westinghouse elec.
Porter 12 ton, 36" gauge, Steam.
6—Flat Cars, 40 tons.
6—Flat Cars, 30 tons. Rebuilt.
26—1¼—2 yd. Side Dp. Cars 46" ga.

CONCRETE MIXERS AND PAVERS

Tilting Mixer, 3 yd. Koehring.
Tilting Mixer 4 yd. Koehring.
3—Jaeger high discharge 2 yd. transit mixers on White truck.
Jaeger 3 yd. transit mixer on Int. truck.
Jaeger 3 yd. transit mixer. Unmounted.
Rex 2 yd. high discharge Moto-Mixer. New, never used.
4—Jaeger 4½ yd. transit mixers on Whitetrucks.
Smith 4 yd. transit mixer, high discharge, on Int. Truck.
Jaeger Model 4 HCS 5 yd. mixer. Unmounted.
2—Jaeger 3 yd. transit mixers.
2—Jaeger 5 yd. transit mixers.
Jaeger 6 yd. Trans. Mixer, Hi-discharge.
5 yd. Jaeger Trans. on Sterling.
3 yd. Jaeger Trans. on Mack.
Multifoote 27-E paver, rebuilt.
20 Mixers 10S, 14S, 21S, 40S, 56S
Rex Pumpcrete Models 160, 190 and 200.
Koehring 28E Paver.

ROAD CONTRACTORS EQUIPT.

Complete Rock Crushing Plant, Cap. 50 tons per hr. Diesel powered.
Jaeger Asphalt Spreader Model BP2.
Road Forms B-K 8100 ft. 9x9. Very good.
Road Forms B-K 4000' 8x8.
Cat. Motor grader No. 11, tandem drive.
Buckeye Fine Grader RB24F 25' wide.
Al-Chal. Model 112 Power Control Grader.
Austin-Western Elev. Grader Model M.
CH&E No. 11 heavy duty Road Pump
Adams motor grader Model 51 Diesel.
Adams Model 511 motor patrol.
Standard Asphalt Plant 3000# including Diesel generating set, storage tanks.

CONCRETE BLOCK—PIPE PLANTS

Universal Pipe Machine #25. Complete.
Multiplex power press with accessories.
Besser K 3 Super Tamper. Complete.
Jolterete #7 Block Machine. Complete.
Stearns Clipper-stripper. Complete.
Besser Victory Model Tamper. Complete.
Besser Super Vibrapac 3 Block Machine, etc.

DERRICK—STEEL & STIFF-LEG

All Steel Stiff leg 25 tons 125 ft. bm.
Steel Guy 25 tons 110' mast, 100' bm.
Steel Guy 35 tons 125' mast, 115' bm.
Steel Guy 20 tons 100 ft. mast, 100' bm.
Steel stiff leg. 15 tons, 80' bm.
American 25 ton Guy derrick 100 ft. bm.

AIR COMPRESSORS

2 Chicago Diesel air compressors 500 cu. ft. on pneumatic tires.
Schramm 420 cfm Diesel portable.
I. R. 2 stage, portable, 315 cu. ft.
I. R. portable, 310 cu. ft. gas.

TRENCHERS—BACKFILLERS

Austin Model 300 Trencher.
Buckeye Backfiller, ½ swing.
Barber-Greene 44A Trencher.
Buckeye 140 Trencher.
Parsons Model 21 and 40 Trenchers.
Parsons 30 Trencher.

MISCELLANEOUS

Galion grader Model 101. Tandem drive.
LeTourneau Super C Model Tournapull.
Water heating plant for ready-mix con.
Kennedy Van Saun 3'x8' Vibrating Screen.
Simplicity 3x6 single deck Vibrating Screen.
Dump truck White, 8 yard body.
Dump truck White, 6 yard body.
2 Euclid 5FD model trucks, 15 tons.

30 CHURCH STREET Cable "RICHWALSH" New York **RICHARD P. WALSH CO.** Telephone: Cortlandt 7-0723 7-0724 **NEW YORK, N. Y.**

DRAGLINE OR CRANE: Lima model 1201 with 80' boom, Cummins diesel motor with long cats, with treads 42" wide, with 3 yd. and 3½ yd. dragline buckets, Koehler light plant; guaranteed condition.

DRAG SCRAPER: Sauerman 1 yd. capacity with Crescent drag scraper bucket, 60 H.P. gasoline powered, 2 speed, Hoist, all cables, blocks, etc.

NEW CONVEYOR BELT: Large quantity 42" and 60" Conveyor Belt, 6 and 7 ply, 7/16" top cover, 1/16" bottom cover, 42 oz. duck; all new; Pure rubber.

GYRATORY CRUSHER: All sizes and types.

JAW CRUSHERS: Traylor 36 x 42", capacity 6" material 144 tons per hour, 4" material 76 tons per hour, manganese fitted, excellent condition. Also, sizes 12 x 24 to 48 x 60.

ROLL CRUSHERS: Double Roll, Allis Chalmers 24 x 54" dia.; 18 x 42" dia.

VIBRATOR FEEDERS: Jeffrey Traylor 6' x 6'6", open pan deck, powered by four No. 5 heavy M-4 motors, including motor generator equipment for 440 volt, 3 phase, 60 cycle, operation; capacity 1500 tons of earth and stone per hour, maximum size stone 3' cubes.
1—48" x 10' with two 58M, 4 power units.

HAMMER MILL: Dixie Mogul size 5024, hopper opening 40 x 24, with $1000.00 worth of extra new wearing parts.

ELECTRIC MINE HOISTS: 1—Single drum 10' dia., 7' face, 450 H.P. 1—10' dia., 10' face, 450 H.P. Each complete with all auxiliary equipment.

KILNS, COOLERS, DRYERS: 1—7'6" x 100' and 1—6'6" x 120', with or without all necessary auxiliary equipment. 1—10' x 90' Cooler or Dryer. Also, several other sizes.

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